



GARY R. HERBERT
Governor

GREGORY S. BELL
Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining

JOHN R. BAZA
Division Director

Outgoing
C0410002
#3725
OK

March 21, 2011

Ken May, General Manager
Canyon Fuel Company, LLC
597 South SR24
Salina, Utah 84654

Subject: Approval of West Lease Modifications and Revised Permit Document, Sufco Mine,
C/041/0002, Task ID #3725

Dear Mr. May:


On February 1, 2011, the Division conditionally approved your application, upon receipt of clean copies, for West Lease Modifications which also included a change in the permit boundary for the Sufco mine (changing the permit boundary to the area covered by the performance bond). We received the clean copies on March 2, 2011. Enclosed is a stamped incorporated copy for insertion into your copy of the Mining and Reclamation Plan.

Also enclosed are two (2) copies of the revised permanent program permit for the Sufco Mine.

Please have both permits signed by the designated signatory authority and return one signed copy to the Division. You should note that the expiration date of the permit did not change but remains May 21, 2012.

If you have any questions, please call me at (801) 538-5334 or Daron Haddock at (801) 538-5325.

Sincerely,


John R. Baza
Director

JRB/DRH/sqs

Enclosure

cc: Kenneth Walker, OSM
Jeff McKenzie, BLM
Pam Brown, USFS
Larry Crist, USFWS w/o
Marc Stilson, Water Rights w/o
Dave Ariotti, DEQ w/o
Chris Wood, DWR w/o
Price Field Office

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**UTAH DIVISION OF OIL, GAS AND MINING
STATE DECISION DOCUMENT
CANYON FUEL COMPANY, LLC
SUFCO MINE
WEST LEASE MODIFICATION**

**Sevier County, Utah
C/041/002**

March 21, 2011

CONTENTS

- * Administrative Overview
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 - OSM Mining Plan Modification Decision, October 12, 2010
 - Agency Notification of Complete Application, October 4, 2010
- * AVS Memo - Section 510(c) finding, dated March 17, 2011

ADMINISTRATIVE OVERVIEW

CANYON FUEL COMPANY, LLC SUFCO MINE WEST LEASE MODIFICATION

**Sevier County, Utah
C/041/002**

March 21, 2011

PROPOSAL

Canyon Fuel Company, LLC made application to the Division of Oil, Gas and Mining for the addition of 3 lease modifications to the authorized mining area which will add 2,312.74 acres for a total of 27,605.17 acres. The Permittee also applied to reduce the permit area to the disturbed and bonded area only, which will change the permitted area to 720.483 acres.

BACKGROUND

The SUFCO Mine, formerly known as the Convulsion Canyon Mine and operated by Southern Utah Fuel Company (SUFCO), is located approximately 30 miles east of Salina, Utah, with the surface facilities and access portals on U. S. Forest Service land in East Spring Canyon, within Section 12, Township 22 South, Range 4 East, Salt Lake Baseline and Meridian. The mine was initially permitted by the Utah Division of Oil, Gas and Mining on May 19, 1987. The permit has since been renewed on May 20, 1992, May 19, 1997, May 19, 2002 and May 19, 2007. The mine commenced operations in 1941, mining federally owned coal. The original mine plan was submitted to the U. S. Geological Survey (USGS) and the Utah Division of Oil, Gas and Mining (DOGM) in 1977. Additional information was submitted, and the mine plan was approved by DOGM pursuant to the Utah Mined Land Reclamation Act on September 14, 1977. The USGS approved the plan on February 3, 1978.

In October of 1979, SUFCO submitted additional information to comply with the regulation of the newly implemented Surface Mining Control and Reclamation Act of 1977. A joint OSM/DOGM review was conducted and the mine plan application was declared complete on July 18, 1983. A permanent program permit was issued to the Coastal States Energy Company on May 19, 1987, consisting of five federal leases and one fee lease for a total of 7,355 acres. The need for a waste rock disposal site was soon apparent. Coastal States applied for a disposal site located on a 40-acre tract of private land located approximately 6 miles west of the mine portals. This waste rock site was approved on August 26, 1988, bringing the revised permit area to a total of 7395 acres.

On July 3, 1989, application was made to add another federal lease known as the Quitchupah Lease to the permit area. Approval for the new lease was obtained and a revised

permit was issued effective December 21, 1989. This new lease brought the total permit area to 17,301 acres.

On December 20, 1996 the permit was transferred to Canyon Fuel Company, LLC.

A lease modification to the Quitchupah lease (150 acres) was submitted in January 1999. This was approved as an incidental boundary change and added to the existing permit area on October 20, 1999.

Canyon Fuel Company, LLC acquired the Pines Tract lease through a lease by application (LBA) process. An EIS was completed for the Pines Tract lease on January 28, 1999 and the lease was issued to Canyon Fuel Company, LLC on September 1, 1999. The state issued a permit on June 22, 2000, and the mining plan approval was signed by the Secretary on July 25, 2000. The SITLA Muddy Tract was approved on January 20, 2006.

Canyon Fuel Company has now applied to add three lease modification areas to the area where they are authorized to conduct mining operations. They have also applied to change their permit area to make it conform to the area bonded for reclamation.

ANALYSIS

No additional surface disturbance is proposed in relation to this permit modification to add the following federal coal leases: SL-062583, U-47080, and U-63214. The addition of these three lease modifications will add 2,312.74 acres to the area authorized for mining. A revised CHIA and a technical review has determined that mining can proceed in these leases in conformance to SMCRA, the R645 coal mining rules and the State Program

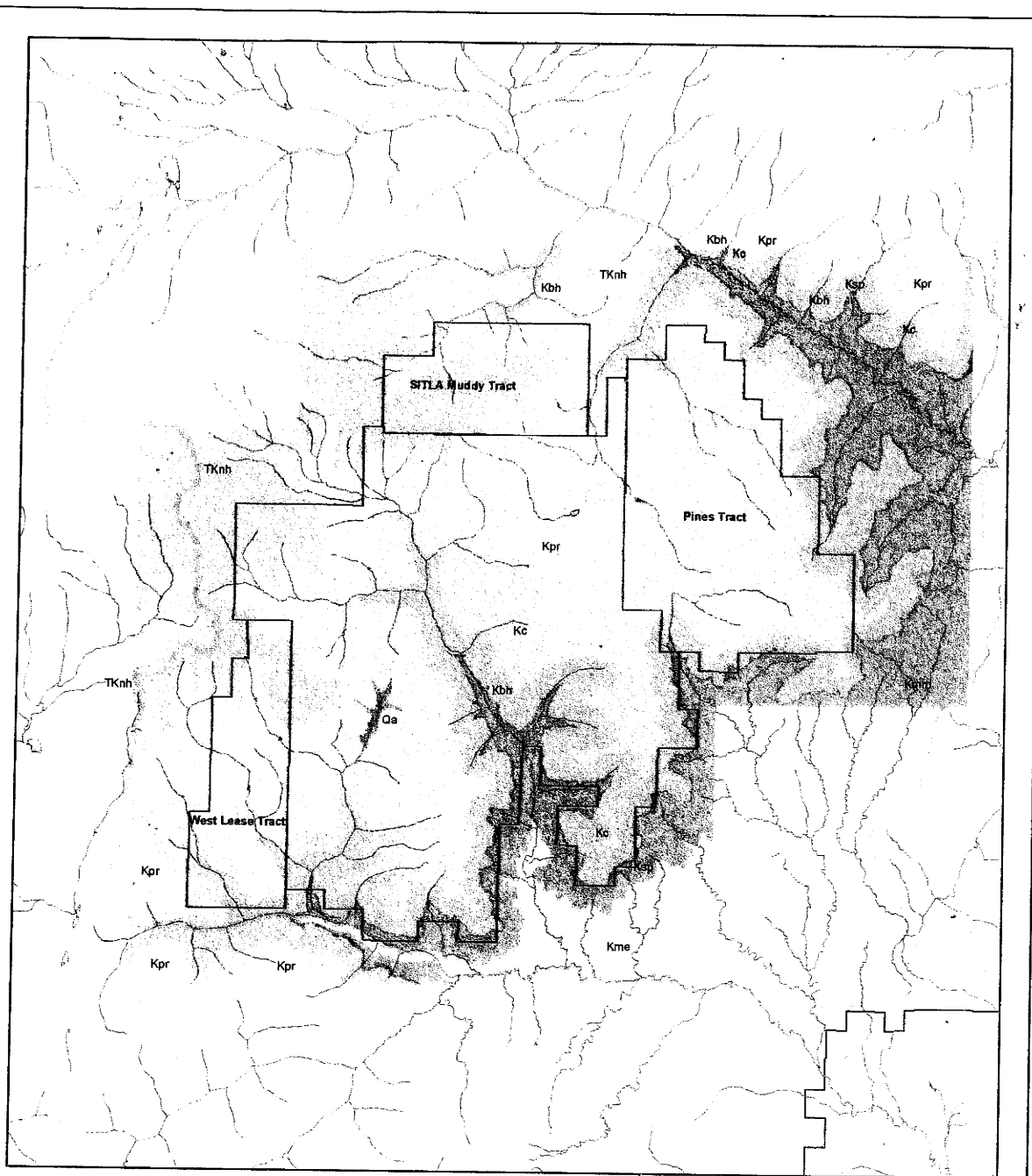
RECOMMENDATION

Canyon Fuel Company, LLC has demonstrated that mining as part of acquisition of these federal leases can be done in conformance with the Surface Mining Control and Reclamation Act, and the corresponding Utah Act and performance standards.

The proposed project expansion was determined not to be a federal mining plan modification by the Office of Surface Mining (OSM) in a letter dated October 12, 2010.

The public notice for this permit revision was last published on November 10, 2010 in the Richfield Reaper. The public comment period ended on December 10, 2010 with only one comment being submitted by an adjacent land owner. This comment was made relative to springs in the Accord Lake area and was adequately addressed in a letter dated January 3, 2011.

It is, therefore, recommended that approval be given for the addition of 2,312.74 acres to the SUFCO Mine area authorized for mining. The total permit acreage will be 720.483 and the total area authorized for conducting underground coal mining and reclamation activities is 27,605.17 acres.



Quitchupah - Muddy Creek

Plate 3

Geology Map

October 2010

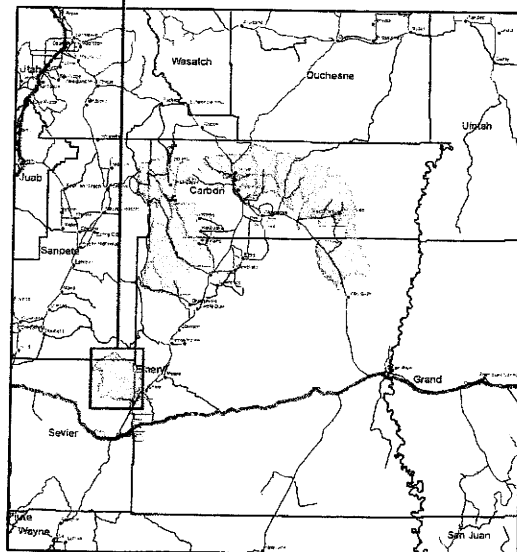
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- | | |
|---|--|
| <ul style="list-style-type: none"> Main Road Graded Road Dirt Road Drainage Lease Area Water Body Quitichupah - Muddy Ck | <ul style="list-style-type: none"> Geology Qf - Landslide Deposits Qa - Unconsolidated Deposit To - Cotton Firm TKh - Flagstaff / North Horn Firm TKh - North Horn Kpr - Price River Firm Kc - Castle Gate Sandstone Kbh - Blackhawk Firm Kp - Star Point Sandstone Kmm - Masak Member Mancos Shale Kme - Emery Sandstone Mancos Shale |
|---|--|



0 0.2 0.4 0.8 1.2 1.6 Miles

1:85,000



PERMITTING CHRONOLOGY
CANYON FUEL COMPANY, LLC
SUFCO MINE
WEST LEASE MODIFICATION

Sevier County, Utah
C/041/002

March 21, 2011

August 30, 2010	West Lease Modification application received to add additional federal coal to the current area authorized for mining.
October 12, 2010	OSM determined that this application is not mining plan modification. However, the Division still decides to review the application as a significant permit revision.
October 4, 2010	The West Lease modification application is determined Administratively complete.
October 20, 2010	Publication commences in the <u>Richfield Reaper</u> for the SUFCO Mine Expansion. The notice was published for four consecutive weekly issues ending on November 10, 2010.
October 18, 2010	Canyon Fuel Company notifies water conservancy district and land owner (USFS) of the intent to mine the West leases.
November 15, 2010	Cumulative Hydrologic Impact Assessment (CHIA) updated.
December 9, 2010	One comment letter received from Leon Christensen expressing concern for springs near the Acord Lakes area.
December 10, 2010	End of public comment period.
December 1, 2010	First round of review completed for the West Lease Addition application.
January 3, 2011	Canyon Fuel Company's first response to the Division's technical analysis of the lease addition application, is received at the Division office. The Division also sends a response to Leon Christensen which addresses the comments he had submitted on December 9, 2010.
February 1, 2011	Second round of review completed for the West Lease Addition application. Conditional Approval of the submittal is issued.

March 2, 2011	Division receives clean copies of the revision.
March 17, 2010	Technical Analysis (TA) updated to include analysis and findings for the West Lease Addition.
March 21, 2010	Final approval of the West Lease Addition is given and a revised permit issued.

FINDINGS

CANYON FUEL COMPANY, LLC SUFCO MINE WEST LEASE MODIFICATION

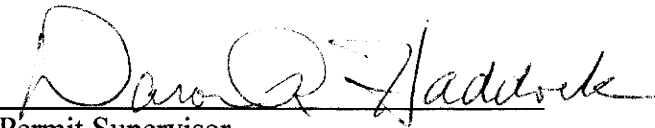
**Sevier County, Utah
C/041/002**


March 21, 2011

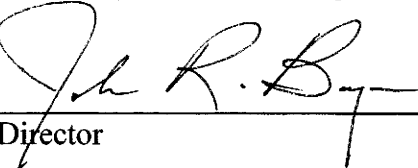
1. The revised plan and the permit application are accurate and complete and all requirements of the Surface Mining Control and Reclamation Act, and the approved Utah State Program (the "Act") have been complied with (R645-300-133.100). See attached Technical Analysis dated March 17, 2011.
2. No additional surface reclamation is required since the additional permit area will be mined as an underground extension of the existing mine. There will be no new surface facilities (R645-300-133.710).
3. The assessment of the probable cumulative impacts of all anticipated coal mining and reclamation activities in the general area on the hydrologic balance has been conducted by the regulatory authority and no significant impacts or material damage findings were identified. The Mining and Reclamation Plan (MRP) proposed under the application has been designed to prevent damage to the hydrologic balance in the permit area and in associated off-site areas (R645-300-133.400 and UCA 40-10-11 {2}{c}) (See Cumulative Hydrologic Impact Analysis [CHIA], updated November 15, 2010).
4. The proposed lands to be included within the permit area are:
 - a. not included within an area designated unsuitable for underground coal mining operations (R645-300-133.220) ;
 - b. not within an area under study for designated lands unsuitable for underground coal mining operations (R645-300-133.210) ;
 - c. not on any lands subject to the prohibitions or limitations of 30 CFR 761.11 {a} (national parks, etc.), 761.11 {f} (public buildings, etc.) and 761.11 {g} (cemeteries);
 - d. not within 100 feet of the outside right-of-way of a public road (R645-300-133.220);
 - e. not within 300 feet of any occupied dwelling (R645-300-133-220).

5. The regulatory authority's issuance of a permit is in compliance with the National Historic Preservation Act and implementing regulations (36 CFR 800) (R645-300-133.600). The acreage proposed in this incidental boundary change is not planned for any surface disturbing activity.
6. The applicant has the legal right to enter and complete mining activities through a federal coal lease issued by the Bureau of Land Management (Leases SL-062583, UTU-47080, UTU-63214) (R645-300-133.300).
7. A 510(c) report has been run on the Applicant Violator System (AVS), which shows that: prior violations of applicable laws and regulations have been corrected; neither Canyon Fuel Company, LLC or any affiliated company, are delinquent in payment of fees for the Abandoned Mine Reclamation Fund; and the applicant does not control and has not controlled mining operations with a demonstrated pattern of willful violations of the Act of such nature, duration, and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (R645-300-133.730). (See attached memo dated March 17, 2011).
8. Underground mining operations to be performed under the permit will not be inconsistent with other operations anticipated to be performed in areas adjacent to the proposed permit area. There are no other permits adjacent to the SUFCO Mine.
9. The applicant has posted financial assurance for the SUFCO Mine Complex in the amount of \$2,874,000.00. (Bond #SUR0000327 issued by Argonaut Insurance Company). No additional surety will be required, since there is no additional surface disturbance proposed (R645-300-134).
10. No lands designated as prime farmlands or alluvial valley floors occur within the permit area or the West lease areas (R645-302-313.100) (R645-302-321.100).
11. The proposed postmining land-use of the permit area is the same as the pre-mining land use and has been approved by the regulatory authority. (See R645-301- 400)
12. The regulatory authority has made all specific approvals required by the Act, the Cooperative Agreement, and the Federal Lands Program.
13. The proposed operation will not affect the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats (R645-300-133.500).
14. All procedures for public participation required by the Act, and the approved Utah State Program have been complied with. This permitting action was published for four consecutive weeks with a 30-day public comment period. One comment was received and addressed. (R645-300-120).

15. No existing structures will be used in conjunction with mining of the underground lease addition other than those constructed in compliance with the performance standards of R645-301 and R645-302 (R645-300-133.720).


Permit Supervisor


Associate Director, Mining


Director

AFFIDAVIT OF PUBLICATION

County of Sevier, State of Utah, ss.

Received

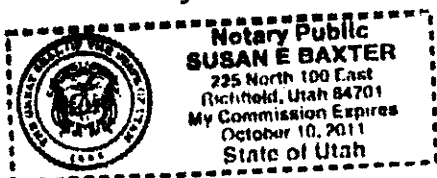
NOV 29 2010

I, SHALON PUZEY, being first duly sworn, depose and say I am the Legal Secretary of THE RICHFIELD REAPER, a weekly paper having a bona fide circulation of more than 200 subscribers in the State of Utah, published every Wednesday at Richfield, Sevier County, Utah, and that said notice was published on Utahlegals.com, a website established by the Utah Press Association through the collective efforts of Utah's newspapers, on the same day as the first newspaper publication and the notice remained on Utahlegals.com until the last day of publication.

That the notice CANYON FUEL a copy of which is attached hereto, was published in said paper for 4 consecutive issues, the first publication having been made in the issue of the 20 day of OCTOBER 2010, and the last publication in the issue of the 10 day of NOVEMBER 2010 that the said notice was published in the regular and entire issue of every number of said paper during the period of times and publication, and that the same was published in the newspaper proper and not in a supplement.

Subscribed and sworn to before me this
10 day of NOVEMBER, 2010

Susan E. Baxter
Notary Public



After filing, copies of the permit application will be available for inspection at the following locations: Utah Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah; and Sevier County Courthouse, Richfield, Utah.

Written Statement of
Official or Employee of
the Department of Justice

FEDERAL

March 21, 2011

**PERMIT
C/041/0002**

**STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1594 West North Temple
Box 145801
Salt Lake City, Utah 84114-5801
(801) 538-5340**

This permit, C/041/0002, is issued for the State of Utah by the Utah Division of Oil, Gas and Mining (DOGM) to:

**Canyon Fuel Company, LLC
225 North 5th Street, Suite 900
Grand Junction, Colorado 81501
(970) 263-5130**

for the SUFCO Mine (previously the Convulsion Canyon Mine.) Canyon Fuel Company, LLC is the lessee of federal, state and fee-owned property. A performance bond is filed with the DOGM in the amount of \$2,874,000.00 payable to the state of Utah, Division of Oil, Gas and Mining and the Office of Surface Mining Reclamation and Enforcement (OSMRE). DOGM must receive a copy of this permit signed and dated by the permittee.

- Sec. 1 STATUTES AND REGULATIONS** - This permit is issued pursuant to the Utah Coal Mining and Reclamation Act of 1979, Utah Code Annotated (UCA) 40-10-1 et seq, hereafter referred to as the Act.
- Sec. 2 PERMIT AREA** - The permittee is authorized to conduct surface disturbing activities only as described in the approved Mining and Reclamation Plan and within areas covered by the Performance Bond which are within the described permit area at the SUFCO Mine situated in the state of Utah, Sevier and Emery Counties, and located as follows:

Mine Site Facility, Water Tank, South Portals, Spring Collection Field, Pump House, Pipeline, Leachfield (Approximately 64.403 acres)

Township 22 South, Range 4 East, SLBM

Section 12: A Portion of the following: E1/2NW1/4,
SW1/4NW1/4NE1/4, S1/2

Portals – 3 East, 4 East, Quitchupah and Link Canyon, Link Canyon Substation No.1 and No. 2 (Approximately 3.368 acres)

Township 21 South, Range 5 East, SLBM

- Section 26: A portion of the following: SE1/4SW1/4SW1/4NW1/4,
E1/2NW1/4NW1/4SW1/4, SE1/4NE1/4SW1/4SW1/4
Section 29: A portion of the following: NW1/4NW1/4SW1/4SE1/4,
NE1/4NW1/4SE1/4SW1/4, NE1/4NE1/4SE1/4SW1/4
Section 32: A portion of the following: NE1/4SW1/4SW1/4NE1/4

Waste Rock Disposal Site (Approximately 41.812 acres)

Township 22 South, Range 4 East, SLBM

- Section 18: NW1/4NE1/4

North Water Mitigation Area (Approximately 542.260 acres)

Township 21 South, Range 5 East, SLBM

- Section 2: A portion of the following: SW1/4SW1/4SW1/4
Section 3: A portion of the following: S1/2SE1/4
Section 10: A portion of the following: NE1/4, N1/2NE1/4SE1/4,
Section 11: A portion of the following: W1/2NW1/4, W1/2SE1/4NW1/4,
E1/2SW1/4, NW1/4SW1/4, S1/2SE1/4, E1/2SW1/4SW1/4,
NW1/4SE1/4, S1/2NE1/4SE1/4
Section 12: A portion of the following: W1/2SW1/4
Section 14: A portion of the following: W1/2NE1/4, NE1/4NW1/4

Quitchupah Fan and Shaft Site (Approximately 68.640 acres)

Township 21 South, Range 5 East, SLBM

- Section 18: A portion of the following: S1/2,
Section 19: A portion of the following: NW1/4NE1/4NE1/4

Total approximately 720.483 acres

Sec. 3 AUTHORIZED MINING AREA - The permittee is authorized to conduct underground coal mining and reclamation activities only as described in the approved Mining and Reclamation Plan and on lands where the "Right-of-Entry" has been acquired. This area includes the area above underground works and areas subject to subsidence and is described as follows:

Federal Coal Lease U-28297 - (2,631.98 acres)

T.21 S., R. 5 E., SLM, Utah

- Sec. 32, lots 1-4, N1/2S1/2
Sec. 33, lot 1, NW1/4SW1/4

T.22 S., R. 5 E., SLM, Utah

- Sec. 4, lot 4, SW1/4NW1/4, W1/2SW1/4

Sec. 5, all
Sec. 7, S1/2NE1/4, E1/2SW1/4, SE1/4
Sec. 8, all
Sec. 17, NE1/4, N1/2NW1/4
Sec. 18, NE1/4, E1/2NW1/4

Federal Coal Lease U-062453 - (480 acres)

T.21 S., R. 5 E., SLM, Utah

Sec. 28, SW1/4SW1/4
Sec. 29, SE1/4SE1/4
Sec. 32, N1/2
Sec. 33, W1/2NW1/4

Federal Coal Lease U-0149084 - (240 acres)

T. 22 S., R. 4 E., SLM, Utah

Sec. 12, NE1/4 and N1/2SE1/4

Federal Coal Lease SL-062583 - (3,079.83 acres)

T.21 S., R. 4 E., SLM, Utah

Sec. 36, S1/2

T.21 S., R. 5 E., SLM, Utah

Sec. 31, all

T.22 S., R. 4 E., SLM, Utah

Sec. 1, lots 1 to 4 incl. S1/2N1/2, S1/2
Sec. 2, SE1/4, S1/2SW1/4
Sec. 3, SE1/4SE1/4
Sec. 10, E1/2NE1/4, NE1/4SE1/4
Sec. 11, N1/2, N1/2S1/2
Sec. 12, NW1/4

T.22 S., R. 5 E., SLM, Utah

Sec. 6, all
Sec. 7, N1/2NE1/4, E1/2NW1/4

Federal Coal Lease U-47080 - (1,953.73 acres)

T.21 S., R. 4 E., SLM, Utah

Sec. 25, all
Sec. 35, E1/2, E1/2SW1/4
Sec. 36, N1/2

T.21 S., R. 5 E., SLM, Utah

Sec. 30, lots 2-4, W1/2SE1/4

T. 22 S., R. 4 E., SLM, Utah

Sec. 2, lots 1-4, S1/2NE1/4, S1/2NW1/4, N1/2SW1/4
Sec. 3, NE1/4SE1/4

Federal Coal Lease U-63214 - (10,695.46 acres)

T. 21 S., R. 4 E., SLM, Utah

Sec. 12, E1/2SE1/4
Sec. 13, E1/2NE1/4, S1/2
Sec. 14, E1/2SW1/4, SE1/4
Sec. 23, E1/2, E1/2W1/2
Sec. 24, all
Sec. 26, E1/2, E1/2SW1/4
Sec. 35, NW1/4, W1/2SW1/4

T.21 S., R. 5 E., SLM, Utah

Sec. 10, SE1/4NW1/4, E1/2SW1/4, E1/2E1/2SW1/4SW1/4,
E1/2E1/2NW1/4SW1/4, E1/2E1/2SW1/4NW1 /4
Sec. 15, W1/2
Secs. 16-21, all
Sec. 22, W1/2
Sec. 26, W1/2NW1/4SW1/4, SW1/4SW1/4
Sec. 27, all
Sec. 28, N1/2, N1/2SW1/4, SE1/4SW1/4, SE1/4
Sec. 29, E1/2NE1/4, NE1/4SE1/4
Sec. 30, lot 1, N1/2NE1/4
Sec. 33, lots 2-4, NE1/4, E1/2NW1/4, NE1/4SW1/4, N1/2SE1/4
Sec. 34, all
Sec. 35, lots 1, 2, W1/2NW1/4, N1/2SW1/4

T.22 S., R. 5 E., SLB&M, Utah

Sec. 3, lots 1-4, S1/2N1/2, NE1/4SW1/4, S1/2SW1/4, N1/2SE1/4,
SW1/4SE1/4
Sec. 4, lots 1, 2, S1/2NE1/4, SE1/4SE1/4
Sec. 9, NE1/4NE1/4
Sec. 10, W1/2NE1/4, NW1/4, N1/2SW1/4

Federal Coal Lease UTU-76195 - (5,694.66 acres)

T.21 S., R. 5 E., SLM

Sec. 2, lots 3, 4, S1/2SW1/4, SW1/4SE1/4
Sec. 10, E1/2
Sec. 11, all
Sec. 12, S1/2SW1/4, NW1/4SW1/4
Sec. 13, NW1/4, S1/2
Sec. 14, all
Sec. 15, E1/2
Sec. 22, E1/2
Sec. 23-24, all
Sec. 25, N1/2, N1/2S1/2

Sec. 26, N1/2, NE1/4SW1/4, E1/2NW1/4SW1/4, SE1/4
T.21 S., R. 6 E., SLM

Sec. 19, lots 3-4, E1/2SW1/4
Sec. 30, lots 1-3, E1/2NW1/4, NE1/4SW1/4

State of Utah Coal Lease ML 49443-OBA - (2,134.19 acres)

T.21 S., R. 5 E., SLB&M

Sec. 4: Lots 1, 2, 3, 4, S1/2S1/2
Sec. 5: Lots 1, 2, 3, 4, S1/2S1/2
Sec. 7: Lots 2, 3, 4, S1/2NE1/4, SE1/4
Sec. 8: All
Sec. 9: All

Fee lands owned by Canyon Fuel Company, LLC as follows:

T.21 S., R. 5 E., SLB&M, Utah

Sec. 29, SW1/4, NW1/4, W1/2NE1/4, W1/2SE1/4
Sec. 30, S1/2NE1/4, E1/2SE1/4
containing 640.00 acres

T. 22 S., R. 4 E., SLB&M, Utah

Sec. 18, NW1/4NE1/4
containing 40 acres

U. S. Forest Service special use permit areas

T. 22 S., R. 4 E., SLB&M, Utah

Sec. 12, portions of S1/2
containing 15.32 acres

This legal description is for the authorized mining area of the SUFCO Mine included in the mining and reclamation plan on file at the Division. The permittee is authorized to conduct coal mining and reclamation operations connected with underground mining on the foregoing described property subject to the conditions of the leases, the approved mining plan, including all conditions and all other applicable conditions, laws and regulations.

- Sec. 4 COMPLIANCE** - The permittee will comply with the terms and conditions of the permit, all applicable performance standards and requirements of the State Program.
- Sec. 5 PERMIT TERM** - This permit expires on May 21, 2012.
- Sec. 6 ASSIGNMENT OF PERMIT RIGHTS** - The permit rights may not be transferred, assigned or sold without the approval of the Director, DOGM. Transfer, assignment or sale of permit rights must be done in accordance with applicable regulations, including but not limited to 30 CFR 740.13(e) and R645-303.

Sec. 7 **RIGHT OF ENTRY** - The permittee shall allow the authorized representative of the DOGM, including but not limited to inspectors, and representatives of OSMRE, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:

- (a) have the rights of entry provided for in 30 CFR 840.12, R645-400-110, 30 CFR 842.13 and R645-400-220; and,
- (b) be accompanied by private persons for the purpose of conducting an inspection in accordance with R645-400-100 and 30 CFR 842, when the inspection is in response to an alleged violation reported by the private person.

Sec. 8 **SCOPE OF OPERATIONS** - The permittee shall conduct surface disturbing activities only on those lands specifically designated as within the permit area (in section 2 above) on the maps submitted in the mining and reclamation plan and permit application and approved for the term of the permit and which are subject to the performance bond. All coal mining and reclamation operations are to be conducted within the bounds of the authorized mining area.

Sec. 9 **ENVIRONMENTAL IMPACTS** - The permittee shall minimize any adverse impact to the environment or public health and safety through but not limited to:

- (a) accelerated monitoring to determine the nature and extent of noncompliance and the results of the noncompliance;
- (b) immediate implementation of measures necessary to comply; and
- (c) warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.

Sec. 10 **DISPOSAL OF POLLUTANTS** - The permittee shall dispose of solids, sludge, filter backwash or pollutants in the course of treatment or control of waters or emissions to the air in the manner required by the approved Utah State Program and the Federal Lands Program which prevents violation of any applicable state or federal law.

Sec. 11 **CONDUCT OF OPERATIONS** - The permittee shall conduct its operations:

- (a) in accordance with the terms of the permit to prevent significant, imminent environmental harm to the health and safety of the public; and
- (b) utilizing methods specified as conditions of the permit by DOGM in approving alternative methods of compliance with the performance standards of the Act, the approved Utah State Program and the Federal Lands Program.

- Sec. 12** **EXISTING STRUCTURES** - As applicable, the permittee will comply with R645-301 and R645-302 for compliance, modification, or abandonment of existing structures.
- Sec. 13** **RECLAMATION FEE PAYMENT** - The operator shall pay all reclamation fees required by 30 CFR Part 870 for coal produced under the permit, for sale, transfer or use.
- Sec. 14** **AUTHORIZED AGENT** - The permittee shall provide the names, addresses and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.
- Sec. 15** **COMPLIANCE WITH OTHER LAWS** - The permittee shall comply with the provisions of the Water Pollution Control Act (33 USC 1151 et seq,) and the Clean Air Act (42 USC 7401 et seq), UCA 26-11-1 et seq, and UCA 26-13-1 et seq.
- Sec. 16** **PERMIT RENEWAL** - Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit in accordance with the Act, the approved Utah State program and Federal lands program.
- Sec. 17** **CULTURAL RESOURCES** - If during the course of mining operations, previously unidentified cultural resources are discovered, the permittee shall ensure that the site(s) is not disturbed and shall notify DOGM. DOGM, after coordination with OSMRE, shall inform the permittee of necessary actions required. The permittee shall implement the mitigation measures required by DOGM within the time frame specified by DOGM.
- Sec. 18** **APPEALS** - The permittee shall have the right to appeal as provided for under R645-300.
- Sec. 19** **SPECIAL CONDITIONS** - There is a special condition associated with this permitting action as described in Attachment A.

The above conditions (Secs. 1-18) are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the lease. The permittee shall require his agents, contractors and subcontractors involved in activities concerning this permit to include these conditions in the contracts between and among them. These conditions may be revised or amended, in writing, by the mutual consent of DOGM and the permittee at any time to adjust to changed conditions or to correct an oversight. DOGM may amend these conditions at any time without the consent of the permittee in order to make them consistent with any new federal or state statutes and any new regulations.

THE STATE OF UTAH

By: 

Date: 3/22/2011

I certify that I have read, understand and accept the requirements of this permit and any special conditions attached.

Authorized Representative of the Permittee

Date: _____

ATTACHMENT A

- 1) Canyon Fuel Company, LLC must submit water quality data for the SUFCO Mine in an electronic format through the Electronic Data Input web site, <http://linux1.ogm.utah.gov/cgi-bin/appx-ogm.cgi>

State of Utah



Coal Regulatory Program

SUFCO Mine
Canyon Fuel Company, LLC
Technical Analysis Task ID #3725
West Coal Lease Significant Revision to Permit

March 17, 2011

TECHNICAL ANALYSIS DESCRIPTION

The Division ensures that coal mining and reclamation operations in the State of Utah are consistent with the Coal Mining Reclamation Act of 1979 (Utah Code Annotated 40-10) and the Surface Mining Control and Reclamation Act of 1977 (Public Law 95-87). The Utah R645 Coal Mining Rules are the procedures to implement the Act. The Division reviews each permit or application for permit change, renewal, transfer, assignment, or sale of permit right for conformance to the R645-Coal Mining Rules. The Applicant/Permittee must comply with all the minimum regulatory requirements as established by the R645 Coal Mining Rules.

The regulatory requirements for obtaining a Utah Coal Mining Permit are included in the section headings of the Technical Analysis (TA) for reference. A complete and current copy of the coal rules can be found at <http://ogm.utah.gov>

The TA is organized into section headings following the organization of the R645-Coal Mining Rules. The Division analyzes each section and writes findings to indicate whether or not the application is in compliance with the requirements of that section of the R645-Coal Mining Rules.

This TA was updated as a result of a significant revision of the permit as defined in R645-303.224. The original application was received on August 30, 2010 for an addition to the permit area known as the West Coal Leases. The application was determined to be a significant revision to the current mine permit. The purpose of the application was two-fold: to add three additional tracts of Federal coal leases to the permit area and also to reduce the permit area to the disturbed areas only.

The addition of the BLM-approved Federal coal leases known as SL-062583, U-47080, and U-63214 bring the total acreage of the three leases to 2,312.74. The permittee also applied to reduce the permit area to the disturbed area only, which will reduce the permit area to 720.483 acres. The existing (larger) permit area will be renamed the "Lease" area and will include the existing Federal, state, fee coal leases, as well as the waste rock disposal site and 15.32 acres under the United States Forest Service (USFS) Special Use permit. The Lease area, with the addition of the proposed West Lease area, will bring the total acreage of the Lease area to 27,605.17. The amendment contains the lease modification approvals from the Bureau of Land Management (BLM) under Environmental Assessment UT-070-08-083. A legal notice was submitted by the Permittee and published in the Richfield Reaper, the local paper in Sevier County in accordance with R645-121.100. On October 4, 2010, the Division sent a letter to multiple agencies inviting comments regarding the West Lease modification plan. No comments were received by the end of the comment period on November 30, 2010.

The proposed lease modification and subsequent mining activity will not involve additional surface disturbance. Mining will occur under approximate depths of cover ranging between 800'- 1,800' of overburden with increasing thickness to the north. The Permittee plans to begin mining in the West Lease area in the fall of 2011.

A new set of Probable Hydrologic Consequences (PHC) were developed for the West Lease area. A revision to the Cumulative Hydrologic Impact Assessment (CHIA) was necessary to expand the CHIA boundary further to the west to accommodate the West Lease area. An updated CHIA report for the Quitchupah and Muddy Creek was issued on November 15, 2010.

This amendment is recommended for approval.

ADMINISTRATIVE INFORMATION

IDENTIFICATION OF INTERESTS

Regulatory Reference: 30 CFR 773.22; 30 CFR 778.13; R645-301-112

Analysis:

The applicant provided a listing of each legal or equitable owner of record of surface and mineral property in the lease area. A legal description and type (i.e. Federal, state) of each of the coal leases listed by Township and Range, total acreage and an updates to the status of when the lease was approved and/or modified.

A check of the Applicant Violator System was run for the SUFCO mine on October 26, 2010 by the Division. The report indicated that there were no outstanding violations issued to Canyon Fuel Company.

Findings:

The information provides meets the Identification of Interests section of the R645-301-112 section of the coal rules.

PERMIT TERM

Regulatory References: 30 CFR 778.17; R645-301-116.

Analysis:

The permit term section of the MRP was updated to show the new total acreage amount of 27,605.17. In addition, two new areas listed as North Water Mitigation and Quitchupah Fan and Shaft sites were added to the lease area. These two areas were recorded as not having any surface disturbance acreage. SUFCO has re-designated their permit boundary on Plate 5-6 and updated the acreage from the original permit boundary listed as 25,292.43 acres and reduced it to 720.483 acres.

The life of the mine was listed with a start date of 1941 up through 2016.

Findings:

The information provided meets the Permit Term section of the MRP.

PUBLIC NOTICE AND COMMENT

Regulatory References: 30 CFR 778.21; 30 CFR 773.13; R645-300-120; R645-301-117.200.

Analysis:

A public notice announcement was published in the Richfield Reaper covering Sevier County beginning on October 18, 2010 and was published for four consecutive weeks. The notice contained all of the information required as per regulations for public notice.

On October 4, 2010, the Division issued a letter of Administrative Completeness to all appropriate Federal, state, and local entities having an interest or jurisdiction in the area of operations. The letter contained information that the application is to be processed as a Significant Revision and included a map depicted the proposed West Lease expansion area. The deadline for agency comments was given as November 30, 2010. No comments were received.

Findings:

A copy of the legal notice was submitted to the Division via email on September 20, 2010 (C0410002\2010\INCOMING) and meets the requirements for public notice as per the Utah 645-Coal Rules.

A copy of the notice for Administrative Completeness is located in (C0410002\2010\OUTGOING), and meets the requirements for public notice and comment as per the Utah 645-Coal Rules.

PERMIT AREA

Regulatory Requirements: 30 CFR 783.12; R645-301-521.

Analysis:

The legal descriptions were updated to include the newly acquired areas for the Federal coal leases that are located in the West Lease expansion area: SL-062583, U-47080, and U-63214 in Chapter 1, Section 112.600 or the MRP. All of these areas encompass SUFCO's West Lease area within Townships 21 and 22 South Range 4 East. The total acreage of the entire lease area was updated and includes all federal coal leases, state coal leases, fee lands and USFS special use permit areas from 25,292.43 to 27,605.17 acres. The revised Permit area boundary is 720.483 acres.

CFC modified Plate 5-6v17, Land Ownership, Lease and Permit Area Map to reduce the permit area, identify the exterior and interior SUFCO Lease boundary and to identify the adjacent area.

According to the map, the Lease Area. The total lease area shown on the map is 27,605.17 acres.

The Adjacent area line is drawn $\frac{1}{4}$ mile beyond all lease areas and totals 34,179.99 acres. The permit area includes some areas outside the lease area, therefore the adjacent area is within less than $\frac{1}{4}$ mile in some areas.

Findings:

The information meets the permit area requirements of the Utah 645-Coal Rules.

HISTORIC AND ARCHEOLOGICAL RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 783.12; R645-301-411.

Analysis:

The document, "A cultural resources inventory for the proposed west tract modifications coal lease, Old Woman Plateau Area, Fishlake National Forest, Sevier County, Utah" is included in the application in appendix 4-2. The report was prepared by Earth Touch inc on October 27, 2008. The inventory resulted in the identification of 15 cultural resource sites including lithic scatters, rock shelters, rock art sites, a lithic source and a historic debris scatter. Out of the 15 sites, 6 sites were recommended eligible for listing in the National Register of Historic Places. The report concluded that effects from undermining, including surface cracking, slumping, or collapsing bedrock outcrops, could have an effect on eligible properties.

A paleontological file review was conducted for the area by the Utah Geological Survey. No significant paleontological sites were identified. Potential for discovery of significant fossil localities exists within the project area. The report concluded that, unless fossils are discovered as a result of these activities, undermining the west lease should have no impact on paleontological resources.

EarthTouch recommended that the following stipulations apply during mining operations in order to avoid damage to cultural resources:

- Personnel and equipment associated with the project should be restricted to those areas cleared for the project.
- Personnel associated with the project should refrain from collecting of otherwise disturbing cultural materials that may be encountered during development
- If unrecorded cultural or paleontological materials are encountered during the project construction, activities in the affected area(s) should cease, and the Utah State Historic

Preservation Office and/or the Fishlake National Forest, should be notified before development in the area is resumed

- Human burials or other physical remains encountered during project construction, require immediate cessation of activity in the affected area, as well as immediate notification of proper authorities. Native American burials or other remains must be reported to the Utah SHPO and appropriate Native American groups.

In the EA in Appendix 3-13, Section 4.2.1.4 states that Forest Service Lease stipulation no. 1 would prevent or require mitigation of potential impacts on heritage or paleontological resources discovered during mining operations.

The West Lease is entirely on Fishlake National Forest property. Therefore, the US Forest Service will review the report and make a determination of effect on cultural resources. This determination will be forwarded to the Utah State Historic Preservation Office for concurrence. Located at the end of Appendix 4-2, a letter from Scott Billat of EarthTouch explains this process.

Findings:

The information provided is considered adequate to meet the minimum regulatory requirements for this section.

CLIMATOLOGICAL RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 783.18; R645-301-724.

Analysis:

Climatological information is provided in Chapter 7, page 7-23. Data has been collected at the mine surface facilities since July 1996. Normal annual precipitation at the mine is about 18 inches per year.

Findings:

The Permittee has submitted sufficient information for this section.

VEGETATION RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 783.19; R645-301-320.

Analysis:

Appendix 3-13 includes an Environmental Assessment of the West Coal Lease Modification area prepared by the BLM. Section 3.0 of the report describes the affected environment. The vegetation community types in the west coal lease area include: Ponderosa pine/ curl leaf mahogany, riparian, mountain sage, mixed conifer, gambel oak/ mountain juniper, Asen, perennial grass, mountain shrubs, pinion/ juniper, and others. No disturbance to vegetation is expected from mining.

Plant Communities and sampling areas are shown on Plate 3-1v8.

Findings:

The information provided is considered adequate to meet the minimum regulatory requirements for this section.

FISH AND WILDLIFE RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 784.21; R645-301-322.

Analysis:

The EA in Appendix 3-13 reviewed the presence of Forest Service Sensitive species and Management Indicator Species in the West Coal Lease area. (Sections 3.3.3.1, 3.3.3.2).

In Section 4.2.1.3, it was found that three sensitive species could be adversely affected by mining. These species included: Spotted bat, townsend's big eared bat, and greater sage grouse. The report also states that individuals from these species could be affected but mining will not affect population viability or contribute to a trend toward federal listing.

Two groups of Management Indicator species also could be potentially affected by mining. These groups included riparian nesters and aquatic macroinvertebrates. The report states that the potential adverse effects are low and that forest-wide population trends would not be affected.

Findings:

The information provided is considered adequate to meet the minimum regulatory requirements for this section.

LAND-USE RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.22; R645-301-411.

Analysis:

Land use information for the west coal lease is included on Plat 4-1Av6. Land uses in this modification area include: US forest service management, Habitat for management indicator species, and intensive livestock management.

Findings

The information included is considered adequate to meet the minimum regulatory requirements for this section.

ALLUVIAL VALLEY FLOORS

Regulatory Reference: 30 CFR Sec. 785.19; R645-302-320.

Analysis:

The Permittee has provided alluvial valley (AVF) floor characterization in Plate 9-1 and described the potential for flood irrigation of lands in the MRP. Hydrologic resource information has been reviewed concerning the potential for AVFs existing within and down stream. AVFs potential exists at the mouth of the large canyons, several miles away from the mine area. Previous assessments conclude there will be no impacts from disturbance of the facilities.

Findings:

The Permittee has provided sufficient information to address this section.

PRIME FARMLAND

Regulatory Reference: 30 CFR Sec. 785.16, 823; R645-301-221, -302-270.

Analysis:

The NRCS prime farmland determination is found in Appendix 2.1. No prime farmland exists within or adjacent to the PTL.

Findings:

The information provided meets the regulatory requirements of this section.

GEOLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 784.22; R645-301-623, -301-724.

Analysis:

A description of the overall lease area geology is provided in Section 6, of the MRP. A more detailed geologic description of the formations found in the West Lease area is found in Appendix 7-24. Mining will take place in the Upper Hiawatha coal seam of the Blackhawk Formation. The Blackhawk formation consists of massive cliff forming fine to medium-grained sandstone units and thinly bedded sandstone and shale units in the lower 300 feet of the formation. The Blackhawk formation in the West Lease area is estimated to be approximately 800 feet thick. The coal seam to be mined in the West Lease area is estimated to be 10 to 13 feet thick and directly overlies the Starpoint Sandstone. Overlying the Blackhawk formation is the Castlegate Sandstone which is a cliff-forming unit comprised of massive course-grained sandstone with some interbedded shale, siltstone and conglomerates. The Castlegate formation is estimated to be approximately 200 feet thick in the study area. The Price River Formation disconformably overlies the Castlegate Sandstone and forms rolling low-lying hills consisting of gray to white sandstones interbedded with fluvial deposits of shale and conglomerates. The Price River Formation is estimated to be approximately 550 feet thick in the study area. The North Horn Formation overlies the Price River Formation in the northerly sections of the West Lease boundary. This unit consists of reddish shale with minor sandstone and conglomerate units. It is estimated to be approximately 1,490 feet thick in the study area. Rock units in the study area strike approximately 40°E and dip 1 to 2° to the northwest. The coal seam is reported to dip anywhere between 1 to 10 degrees. Major faulting has not been identified in the West Lease area. Minor faults and joints likely exist in the West Lease area in the Castlegate Sandstone.

The following table presents the water resources and the average thickness of overburden at those locations relative to the coal seam.

Water Resource	Depth of Overburden (ft.)	Description
Middle Duncan Spring	1,300	Developed spring with stockwatering trough along with Duncan Draw
Mud Spring	1,000	Developed spring with stockwatering trough
Lower Mud Spring	900	None - a pond exists in drainage below spring area
Mud Spring Hollow Stream	900	Mud Spring Hollow
Broad Hollow Stream	800	Broad Hollow

Broad Hollow Spring	800	Broad Hollow. Developed spring that is used by the Quitchupah Stockgrowers Association
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Source: SUFCO Overburden Isopach Map, Plate 5-11v3, SUFCO MRP.

SUFCO has experienced subsidence-induced fracturing of overlying strata during previous longwall mining operations. As a result, several springs in the Pines tract of the Lease area have seen depletions or relocations of their normal flow regimes. This scenario has occurred at spring locations that are fed by the shallow bedrock system in the Castlegate Sandstone where depth of overburden has been approximately 900 feet and only a thin veneer of bedrock from the Price River formation is present. These conditions appear to replicate in the West Lease area at one spring location: Broad Hollow Spring, a developed spring operated by the Quitchupah Stockgrowers Association. This spring discharges from the Castlegate Sandstone at an observed rate of 0.25 gpm. SUFCO intends to avoid undermining this spring by locating their westernmost panel approximately 1,030 feet to the east of Broad Hollow Spring.

SUFCO has indicated that they plan to increase their exploration drilling from five to up to ten holes within the next five years (see MRP page 6-15). These exploration hole locations are shown on Plate 6-1v.7. Drill log data were submitted in the confidential binder associated with the significant revision amendment as Appendix 6-1. The subsidence map, Plate 5-10A shows that the limits of subsidence will not extend into the Pin Hollow/Broad Hollow area.

Findings:

The information provided by the Permittee meets the minimum requirements of the Geologic Resources Information section of the regulations.

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-724.

Analysis:

The West Lease area is situated in the portion of the plateau which appears to be drier than the other areas further to the east/northeast. The principal drainages in the West Lease include: the south fork of Quitchipah Creek drainage, the Duncan Draw drainage, the Mud Spring Hollow drainage, and the Broad Hollow drainage. The only drainage that has a perennial flow is the South Fork of Quitchipah Creek – located just outside the West Lease boundary. All of the other drainages are ephemeral in nature and form gently moderate to steep canyons that trend from the northwest to the southeast. The flow path from these drainages is toward the south/southeast which ultimately discharges to Quitchupah Creek in Convulsion Canyon.

The following table presents the water resources that are have been identified and monitored in and adjacent to the West Lease area.

NAME	MONITORING PERIOD	AVERAGE FLOW	LOCATION/USE
SUFCO 006 Stream	Since 1983	186 gpm	South Fork of Quitchipah Creek located just outside the northeast boundary of the West Lease area
SUFCO 046 Stream	Since 1983	47 gpm	Convulsion Canyon
SUFCO 047A Stream	Since 1983	73 gpm	Quitchipah Creek tributary below SUFCO surface facilities
Duncan Draw Stream	Since 2007	DRY	Duncan Draw
Middle Duncan Spring	Since 2008	DRY	Developed spring with stockwatering trough along with Duncan Draw
SUFCO 57A Spring	Since 1987	<0.25 gpm	Developed spring with stockwatering trough at Upper Duncan Draw
Upper Mud Spring	Since 2007	DRY	Developed spring with stockwatering trough
Middle Mud Spring	Since 2007	DRY	None - a pond exists in drainage below spring area
Mud Spring	Since 2007	DRY	Developed spring with stockwatering trough
Lower Mud Spring	Since 2007	DRY	None - a pond exists in drainage below spring area
Mud Spring	Since 2007	DRY	Mud Spring Hollow
Broad Hollow Stream	Since 2007	DRY	Broad Hollow
Broad Hollow Spring	Since 2007	<0.25 gpm	Broad Hollow - Developed spring that is used by the Quitchipah Stockgrowers Association
GW-8 Spring	Sporadic data from 1970s, 80s, Aug 2010	3.02 gpm	Lizonbee Springs: one mile west of W.L. boundary used for stockwatering and wildlife.
GW-9 Spring	Sporadic data from 1970s, 80s, Aug 2010	1.65 gpm	Lizonbee Springs: one mile west of W.L. boundary used for stockwatering and wildlife.
SUFCO 001 (East Spring)	Since 1980	2.07 gpm	At the head of Spring Canyon. Developed spring with stockwatering trough.
SUFCO 047 Spring	Since 1983	26.3 gpm	Developed spring used for SUFCO mine as water source. At intersection of East Spring and Convulsion Canyons.
US-81-3 Well	Since 1982	1,618 depth to water	Blackhawk Fm. (Upper Hiawatha Coal Seam)

Source: Table 2 in Appendix 7-24 of the SUFCO MRP. Note: The **highlighted** locations represent the monitoring locations that are within the boundary of the West Lease area.

Findings:

All of the above-listed springs discharge either from the Price River Formation or the Castlegate Sandstone. Isotopic data collected from these spring as well as several others that have been studied in the region indicate that these springs are associated with an actively recharging groundwater system that is of modern age and in good hydraulic communication with the surface. As such, these springs typically respond to wet and dry climatic cycles. As can be seen on the table presented above, the only spring within the West Lease boundary that has shown any indication of flow conditions is the Broad Hollow Spring.

A second inactive groundwater system has been identified showing isotopic signatures of ancient groundwater contained within the deeper strata of the Blackhawk and Starpoint Sandstone formations. This groundwater system is typically expressed as isolated perched pockets confined to sandstone lenses which are considered hydrologically isolated from the overlying active groundwater system. Mine workings are anticipated to intercept these ancient perched water systems; however based on SUFCO's prior experience with mining operations through this ancient inactive groundwater system, these groundwater inflows are expected to be of short duration and of similar magnitudes to those previously encountered perched systems. Due to the heterogeneous nature of the overlying Price River and Castlegate formations showing a variety of discontinuous sandstone, siltstone, and shaley lithologies, waters from the surface do not typically infiltrate downward in any direct migration route to recharge the deeper strata below and therefore, recharge to this inactive groundwater system from overlying units is considered minimal to remote.

SUFCO plans to begin longwall mining operations in the fall of 2011. The panels will be situated in a north-south orientation in the West Lease area (see Plate 5-10 in the MRP). SUFCO's proposed mine plan demonstrates that the Broad Hollow spring area will be avoided and not undermined.

The information provided by the Permittee meets the minimum requirements of the Environmental Resource Information section of the regulations.

Sampling and analysis

The Permittee had conducted surveys on streams, springs, ponds and wells. Sampling will continue throughout the life of the mining operation, through reclamation.

Table 7-2, *Water Monitoring Program*, located on page 7-41 of the SUFCO MRP depicts the sampling locations for the entire lease area. Four springs have been added to the sampling program from the West Lease area: Mud Spring, Broad Hollow Spring and the Lizonbee Springs

that run along the Acord Lakes fault. The springs have been developed for livestock watering use. The springs are proposed for quarterly monitoring of both field and operational parameter sampling for a period of two years. After that, then the sampling routine will involve discharge and field parameter sampling only.

For stream sites in the West Lease area, no perennial or intermittent stream sites are present. In accordance with the existing SUFCO water monitoring program, continued monitoring of the South Fork of Quitchupah Creek (SUFCO 006) immediately north of the West Lease boundary will take place. Other stream monitoring sites in the general vicinity such as SUFCO 047A and SUFCO 042 are also part of the existing monitoring program. One monitoring well US-81-3, which has been inactive since 1997, will be reinstated for the purpose of monitoring groundwater depth to water levels in the West Lease area. This well is screened in the Upper Hiawatha coal seam and will be a good indicator of groundwater conditions in the mine as longwall mining progresses.

Baseline Information

Spring and seep inventories have been performed in the area of the West Lease previously for the purposes of prior permitting actions for the SUFCO mine. Baseline monitoring has been conducted for stream, spring, and groundwater monitoring wells in and around the West Lease area at minimum, since 2007. Most of the stream and critical springs have been continuously monitored as part of SUFCO's existing water monitoring program that has been in place since the early 1980s.

Figure 2, in the Petersen Hydrologic report shows all the baseline sample locations that are monitored in and surrounding the West Lease area. Most of the spring locations in the West Lease area and the area to the northwest are reported to have been dry since the monitoring period began. The exception being Broad Hollow Spring, which has had a recorded flow of approximately 0.25 gpm.

Lizonbee Springs, which are depicted on the map on Figure 2 as GW-8 and GW-9 are reportedly located on a fault zone approximately 0.8 miles west of the West Lease boundary and are described as being used for stockwatering and wildlife. Based on their isotopic geochemistry, these springs are believed to discharge from the Price River formation, indicating that the groundwater has a modern-age component. Baseline data from the Lizonbee springs was somewhat limited in that the United States Geological Survey (USGS) had collected water quality data on these springs in the 1970s and 1980s. However, these data were sporadic and no recorded data was available after 1986. The exception being that Petersen Hydrologic had sampled these springs in August 2010 and found that flow rates and other field parameters were consistent with those reported in the 1970s and 1980s. The average discharge from springs GW-8 and GW-9 have been reported at 3.02 and 1.65 gpm, respectively. TDS concentrations from GW-8 and GW-9 have been reported at average concentrations of 758 and 689 mg/L., respectively.

Baseline Cumulative Impact Area Information

The proposed lease expansion areas are just beyond the existing CHIA boundary that was last updated for the Quitchupah and Muddy Creek by the Division in 2005 required an update based on the addition of the West Lease expansion. The CHIA boundary will expand further westward along Convulsion Canyon and turn northward up through Collier Hollow and run along the fault-graben valley associated with Acord Lakes, located in T 22 S, R 4 E, Sections 10, 4, and 33. The Acord Lakes structural valley contains a normal fault with approximately 200 feet of vertical offset creating a closed basin (Thiros and Cordy, 1991).

Baseline data collection for the West Lease area have been collected concurrently with ongoing water monitoring data collection associated with the existing water monitoring program for the mine. Additional baseline data collection points were added for the expansion into the West Lease area in 2007 in order to obtain seasonal information. Lizonbee Springs are now located within the updated CHIA boundary. The springs are reported to discharge from the Price River Formation/Alluvium boundary. However, according to the geologic map of the area, these springs lie directly on the contact between the Price River Formation and the Castlegate Sandstone.

Probable Hydrologic Consequences Determination

The PHC is discussed beginning on page 37 in Appendix 7-24 in the Petersen Hydrologic Report for the West Lease area. Longwall mining in the proposed lease expansion areas could produce land subsidence and bedrock fracturing that could potentially impact the hydrologic balance if fracturing increases the vertical hydraulic conductivity of overburden rock and consequently lower the water table to a depth that is below existing discharge locations for the springs.

The PHC discussion on page 44 in Appendix 7-24 rules out impacts to the deep ancient groundwater systems resulting from infiltration from the near-surface groundwater system. Based on the available information on the geology, prior experience with mining activities, and the two distinct groundwater systems in the hydrologic regime, the likelihood of surface water or shallow groundwater migrating from the near surface into the underlying mine workings where the depths of cover exceed several hundred feet is considered remote. The reasons cited were the heterogenous lithology of the Price River and North Horn formations that are characterized as having relatively low permeability rates that would inhibit downward vertical migration of groundwater into the deeper strata. Isotopic geochemistry performed on the water samples that originate in the deeper aquifer indicate that there is no chemical signature of a modern recharge component to the groundwater. As has been demonstrated in previous experience with mining operations at the SUFCO mine, the potential for inactive perched groundwater systems will be intercepted during mining activities. These ancient systems have not demonstrated good hydraulic communication with the active overlying aquifer system. The de-watering of these

perched systems will not likely have an impact on the hydrologic balance of the CIA.

Previous undermining of springs has occurred within the SUFCO lease boundary area in the Pines Lease tract at the area known as North Water Spring. Similar geologic conditions exist in the Pines area where surface exposures of Castlegate Sandstone have been susceptible to fracturing undermining springs and causing a lowering/relocation of the shallow groundwater table. The overburden thickness in the proposed West Lease expansion area ranges from 800' to approximately 1,300'. The Broad Hollow area is where surface exposures of Castlegate Sandstone are present, similar to geologic conditions in the Pines Tract. The Broad Hollow spring discharges at a rate of <0.25 gpm; therefore Broad Hollow spring would be the water resource most vulnerable to subsidence-related fracturing. The other water resources noted in the West Lease area include: Middle Duncan Spring, Mud Spring, Lower Mud Spring, Mud Spring Hollow Stream, have not shown any evidence of flow conditions during the baseline monitoring period. Mud Spring Hollow stream is ephemeral in nature and has not shown any flow conditions.

No new topsoil or waste rock piles are anticipated as a result of mining in the West Lease area; therefore, no impacts from acid- or toxic-forming materials are likely to occur. Additionally, mine water discharge from the outfall located in East Spring Canyon is routinely monitored for increases in acidity. Water quality parameters measured from mine water discharge are rarely out of compliance with SUFCO's Utah Discharge Pollutant Elimination System (UPDES) permit.

As no surface facilities or any other type of disturbance is planned for the proposed West Lease expansion, therefore the potential for increased sedimentation to area drainages is negligible. Access to the coal reserves in the West Lease area is planned through new portals being constructed at the mine near the existing surface facilities. Sediment control for the portal construction is being followed according to the sediment control plan found in the approved SUFCO MRP in sections 7.2.8 and 7.3.2.

Findings:

The Division concurs with the Permittees conclusion that subsidence-related impacts are most likely to occur in the Broad Hollow area due to the surficial exposures of Castlegate Sandstone in the Broad Hollow Spring area. SUFCO plans to undertake measures to avoid longwall mining beneath this spring so as to avoid any potential for undermining the spring.

The application meets the Hydrologic Resource Information requirements of the State of Utah R645-Coal Mining Rules.

MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 783.24, 783.25; R645-301-323, -301-411, -301-521, -301-622, -301-722, -

301-731.

Analysis:

Plate 5-6v17, *Land Ownership, Lease, and Permit Area Map* has been updated to depict the redrawn permit and lease area boundaries. Each lease is labeled with its applicable identification number. The adjacent area is shown on the map as an arbitrary ¼ mile blue boundary surrounding the entire lease area.

Plate 5-11v13 Overburden Isopach Map depicts the depth of cover presumably above where longwall mining activities are expected to occur. The map depicts the overburden thickness values as contour lines. In the area of the West Lease where the longwall panels are proposed, the depths of overburden coverage range from 800' – 1,800' and increasing in thickness to the north.

Plate 7-3v16, Hydrologic Monitoring Stations Map has been updated to include the two new spring monitoring locations in the West Lease area: Mud Hollow Spring and Broad Hollow Spring.

Plate 7-2Av5, Surface and Groundwater Rights map has been revised to show the Water Rights inventoried in the West Lease area. The critical springs proposed for sampling, Broad Hollow and Lower Mud Spring are shown on the map with water rights filed on them by the U.S. Forest Service. Lizonbee Springs are not shown on the map in Section 34 T21S R4E.

Certification Requirements

All submitted plates were stamped and signed by John D. Byars a Utah registered professional engineer. The application meets the Certification Requirements of the State of Utah R645-Coal Mining Rules.

Findings:

The Permittee met the minimum requirements of this section.

OPERATION PLAN

MINING OPERATIONS AND FACILITIES

Regulatory Reference: 30 CFR Sec. 784.2, 784.11; R645-301-231, -301-526, -301-528.

GENERAL REQUIREMENTS

Regulatory Reference: PL 95-87 Sec. 515 and 516; 30 CFR Sec. 784.13, 784.14, 784.15, 784.16, 784.17, 784.18, 784.19, 784.20, 784.21, 784.22, 784.23, 784.24, 784.25, 784.26; R645-301-231, -301-233, -301-322, -301-323, -301-331, -301-333, -301-341, -301-342, -301-411, -301-412, -301-422, -301-512, -301-513, -301-521, -301-522, -301-525, -301-526, -301-527, -301-528, -301-529, -301-531, -301-533, -301-534, -301-536, -301-537, -301-542, -301-623, -301-624, -301-625, -301-626, -301-631, -301-632, -301-731, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-732, -301-733, -301-746, -301-764, -301-830.

Analysis:

The Permittee has identified probable hydrologic consequences of the mine, which are described in Appendix 7-24, Probable Hydrologic Consequences. The addition of the West Leases were outside the existing hydrologic basins that could potentially be affected by mining in the cumulative impact area (CIA) and subsequently, an update to the CHIA was necessary.

Included in Chapter 5 of the application is all of the modified MRP text that demonstrates compliance with the engineering section of the Utah Coal Mining Rules (R645-301-500). The changes to Chapter 5 are minimal and for the most part details a replacement of permit area details with that of lease area details, as both the permit and lease areas have been modified. There are also statements in which the operator designation is changed from "Southern Utah Fuel Company" to "Canyon Fuel Company, LLC SUFCO Mine". In addition, a new plate (5-10AC) will be added to the MRP. Plate 5-10AC was submitted as confidential and will be kept within the confidential portion of the MRP.

Findings:

Information provided in the proposal is adequate to meet the requirements of this section of the regulations.

PROTECTION OF PUBLIC PARKS AND HISTORIC PLACES

Regulatory Reference: R645-301-140

Analysis:

There are no public parks or historic places in the West Lease area.

Findings:

Information provided in the proposal is considered adequate to meet the requirements of this section of the regulations.

EXISTING STRUCTURES:

Regulatory Reference: 30 CFR Sec. 784.12; R645-301-526.

Analysis:

There are no existing structures in the West Lease area. Access portals and tunnels to the coal in this area are being permitted as separate amendments (under Task #s: 3548 and 3725).

Findings:

Information provided in the proposal is adequate to meet the requirements of this section of the regulations.

AIR POLLUTION CONTROL PLAN

Regulatory Reference: 30 CFR Sec. 784.26, 817.95; R645-301-244.

Analysis:

The Permittee has proposed no activities that should require changes to the Air Quality Approval Order, so no changes are needed to this section of the mining and reclamation plan.

Findings:

Information provided in the proposal is adequate to meet the requirements of this section of the regulations.

COAL RECOVERY

Regulatory Reference: 30 CFR Sec. 817.59; R645-301-522.

Analysis:

The Permittee has supplied maps, plans to show where mining will take place.

Findings:

The Permittee met the minimum requirements of this section.

SLIDES AND OTHER DAMAGE

Regulatory Reference: 30 CFR Sec. 817.99; R645-301-515.

Analysis:

The existing plan is considered adequate.

Findings:

The Permittee met the minimum requirements of this section.

SUBSIDENCE CONTROL PLAN

Regulatory Reference: 30 CFR 784.20, 817.121, 817.122; R645-301-521, -301-525, -301-724.

Analysis:

The application included a Potential Plan Subsidence Limits Map (Plate 5-10Av9) that indicates the expected extent of possible subsidence areas. Subsidence is expected to occur within the area of the West Lease areas as portions of the area will be mined using full extraction mining methods. Though most of the area within the West Lease portion will be affected by subsidence eventually, it is not expected to have any significant variance from the subsidence that had occurred at other locations where the same mining method has been used. There are no significant differences between the overburden that exists above the West Lease area and overburden that exists above longwall panels in the northern portions of previously leased/mined areas.

For monitoring purposes, there are control points and aerial targets that are located (approximately) along the eastern border of the development and longwall sections that will be mined within the West Lease area.

From the southeastern most corner (greatest distance) of the West Lease area, a control point (Rim Rock) can be located within 5,500 feet. Multiple control points & aerial targets are within range to be used as monitoring stations for subsidence that occurs in the West Lease area. These control points and monitoring stations are surveyed using aerial photography annually. Subsidence monitoring details are provided to the Division via annual reports.

Findings:

The subsidence control measures and monitoring methods are sufficient to accommodate the West Coal Lease Modification. Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

FISH AND WILDLIFE INFORMATION

Regulatory Reference: 30 CFR Sec. 784.21, 817.97; R645-301-322, -301-333, -301-342, -301-358.

Analysis:

Endangered and Threatened Species

Section 3.3.3 of the EA in Appendix 3-13 states that no federally listed or candidate plant or wildlife species or their critical habitats have been identified in the project area.

Bald and Golden Eagles

Two golden eagle nests are located adjacent to the west coal lease area. No active golden eagle nests are located within the lease area. The only potential effects to raptors from mining would be through subsidence. Subsidence should not affect the identified nests due to their location.

Wetlands and Habitats of Unusually High Value for Fish and Wildlife

Section 3.3.2 of Appendix 3-13 discusses wetlands in the west coal lease area. Five wetland areas were identified associated with springs in the area. No surface effects area proposed to occur as a result of undermining. Water replacement plans are required if water loss occurs as a result of undermining. Mitigation Measures are summarized in section 4.2.1.5 of the EA in Appendix 3-13.

Findings:

The information provided is considered adequate to meet the minimum regulatory requirements for this section.

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 773.17, 774.13, 784.14, 784.16, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-300-140, -300-141, -300-142, -300-143, -300-144, -300-145, -300-146, -300-147, -300-148, -301-512, -301-514, -301-521, -301-531, -301-532, -301-533, -301-536, -301-542, -301-720, -301-731, -301-732, -301-733, -301-742, -301-743, -301-750, -301-761, -301-764.

Analysis:

The Permittee (Canyon Fuel Company, LLC / SUFCO Mine) has performed a hydrologic investigation of the water resources found in the West Lease area (see Appendix 7-24 of the MRP). The only water resource identified that has indications of flow is Broad Hollow Spring, a developed spring used by the stockgrowers in the area.

Water quality standards and effluent limitations.

The Permittee has added additional sample locations in the West Lease area to their existing water monitoring plan. The permittee will adhere to the same water sampling protocol outlined in their MRP for the samples collected in the West Lease. Aside from the portals that will be located in the upper mine yard of East Spring Canyon, there are no disturbed areas in the West Lease area. Therefore, no additional UPDES outfall locations are planned for this area.

Stream buffer zones.

The Permittee has implemented stream buffer zones along perennial reaches.

Diversions: General

Not applicable as the West Lease area is not part of the disturbed area.

Sediment Control Measures

Not applicable as the West Lease area is not part of the disturbed area.

Discharge Structures

Not applicable as the West Lease area is not part of the disturbed area.

Impoundments

Not applicable as the West Lease area is not part of the disturbed area.

Findings:

The Permittee has submitted sufficient information to address this section.

MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

Analysis:

The application includes new & replacement maps with the following information: plant communities and sampling areas, wildlife habitat & ranges, land uses, previously mined areas, existing surface and subsurface facilities and features, land ownership, lease and permit areas, potential subsidence limits, overburden isopachs, geology, drill hole location, surface and ground water rights and hydrologic monitoring stations.

Findings:

The submitted application is adequate in terms of maps providing details of resource and operational information that are relevant to the West Coal Lease Modification. In addition, a registered professional engineer has certified all maps.

Certification Requirements

All submitted plates were stamped and signed by John D. Byars a Utah registered professional engineer. The application meets the Certification Requirements of the State of Utah R645-Coal Mining Rules.

Findings:

The Permittee has submitted sufficient information to address this section.

RECLAMATION PLAN

GENERAL REQUIREMENTS

Regulatory Reference: PL 95-87 Sec. 515 and 516; 30 CFR Sec. 784.13, 784.14, 784.15, 784.16, 784.17, 784.18, 784.19, 784.20, 784.21, 784.22, 784.23, 784.24, 784.25, 784.26; R645-301-231, -301-233, -301-322, -301-323, -301-331, -301-333, -301-341, -301-342, -301-411, -301-412, -301-422, -301-512, -301-513, -301-521, -301-522, -301-525, -301-526, -301-527, -301-528, -301-529, -301-531, -301-533, -301-534, -301-536, -301-537, -301-542, -301-623, -301-624, -301-625, -301-626, -301-631, -301-632, -301-731, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-732, -301-733, -301-746, -301-764, -301-830.

Analysis:

The Permittee has provided a reclamation plan in the MRP, page 7-48. Since the portal area is the only surface disturbance in the West Lease area, surface reclamation is relatively small. Any surface disturbance from subsidence or affects to the hydrologic system in the West Lease area would be covered in mitigation during the operation phase.

Findings:

The Permittee has submitted sufficient information for this section

POSTMINING LAND USES

Regulatory Reference: 30 CFR Sec. 784.15, 784.200, 785.16, 817.133; R645-301-412, -301-413, -301-414, -302-270, -302-271, -302-272, -302-273, -302-274, -302-275.

Analysis:

The Permittee has proposed no changes to the postmining land uses of wildlife habitat and grazing.

Findings:

Information provided in the proposal is adequate to meet the requirements of this section of the regulations.

PROTECTION OF FISH, WILDLIFE, AND RELATED ENVIRONMENTAL VALUES

Regulatory Reference: 30 CFR Sec. 817.97; R645-301-333, -301-342, -301-358.

The revegetation plan in the current mining and reclamation plan is designed for the wildlife and grazing postmining land uses. It complies with regulatory requirements.

Findings:

Information provided in the proposal is adequate to meet the requirements of this section of the regulations.

CESSATION OF OPERATIONS

Regulatory Reference: 30 CFR Sec. 817.131, 817.132; R645-301-515, -301-541.

Analysis:

The Permittee addressed this in the MRP. If the Permittee were to cease operations, they would notify the Division within 30 days. The Permittee would report the number of surface and underground acres disturbed and the monitoring procedures during temporary cessation.

Findings:

The Permittee met the minimum requirements of this section.

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

Analysis:

The hydrologic elements of the approved reclamation plan are discussed in the approved MRP. As no surface disturbance is planned with the proposed West Lease expansion, the reclamation requirements relative to hydrology are not applicable.

Impacts from the proposed mining activity in the lease expansion areas are covered under the Subsidence Control plan. In the event that mining in the proposed lease expansion area produces hydrologic impacts, the Permittee is required to mitigate the impacts and restore the hydrologic function that was impaired.

Findings:

The application meets the Hydrologic Reclamation requirements of the State of Utah R645-Coal Mining Rules.

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-323, -301-512, -301-521, -301-542, -301-632, -301-731.

Affected area boundary maps.

Analysis:

The permit area maps and the mine maps show the affected area boundaries. Bonded area map.

The bonded area is the permit area and is shown on several maps. Reclamation backfilling and grading maps.

The Permittee did not provide the Division with backfilling and grading maps for the portal breakout areas.

Reclamation facilities maps.

Analysis:

The Permittee does not proposes to leave any facilities. Final surface configuration maps.

The Permittee did give the Division the final surface configuration maps for the overflow pond area.

Findings:

The Permittee met the minimum requirements of this section.

BONDING AND INSURANCE REQUIREMENTS

Regulatory Reference: 30 CFR Sec. 800; R645-301-800, et seq.

Analysis:

Form of Bond

The bond held by the Division to reclaim the SUFCO Mine is a surety issued by the Argonaut Insurance Company, which has an A.M. Best rating of "A" (as of March 17, 2010).

Determination of Bond Amount

The amount of bond held for the SUFCO Mine is \$ 2,874,000.00 (2010 dollars).

The portal area is the only disturbed portion that is under bond for the West Lease area. According to an internal memo prepared by Pete Hess (Task #3739, dated March 2, 2011).

The bond amount required to cover the reclamation of the West Lease portal area is 2,369,000.00 (escalated to 2015 dollars). Therefore, SUFCO has an additional \$ 505,000 of additional bond coverage.

The bond posted for the SUFCO Mine is \$ 2,874,000.00 is considered adequate.

Terms and Conditions for Liability Insurance

The Permittee maintains adequate general liability insurance coverage for this site, which is renewed on a yearly basis.

Findings:

The Permittee met the minimum requirements of this section.

**QUITCHUPAH AND MUDDY CREEK
CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT
(CHIA)**

For

Canyon Fuel Company

SUFCO Mine
C/041/0002

In

Sevier County, Utah

November 15, 2010

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I. INTRODUCTION

The Quitichupah and Muddy Creek Cumulative Impact Area (CIA) are located in Sevier County, Utah, west of the town of Emery (Plate 1). There is currently one active mine in the Quitichupah/Muddy Creek CIA – Canyon Fuel Company's SUFCO Mine. The SUFCO Mine presently encompasses three existing tracts of land: The Pines Tract, the Quitichupah Tract and the SITLA Muddy Tract. Expansion of the SUFCO Mine with the addition of the West Lease Modification (WLM) Area located west of the existing lease area in Township 22 South Range 4 East has facilitated this review and update of the Quitichupah/Muddy Creek Cumulative Hydrologic Impact Assessment (CHIA). The addition of the WLM adds approximately 5.5 square miles and will expand the total lease area to 27,605.17 acres.

The Division has the responsibility to assess the potential for mining impacts both inside and outside permit areas. The CHIA is a findings document prepared by the Division that assesses whether existing, proposed, and anticipated coal mining and reclamation operations have been designed to prevent material damage to the hydrologic balance outside the permit areas. The Division cannot issue a permit to a proposed coal mining operation if the probable, anticipated hydrologic impacts will create material damage to the hydrologic balance outside the permit area. The CHIA is not only a determination if coal mining operations are designed to prevent material damage beyond their respective permit boundaries when considered individually, but also if there will be material damage resulting from effects that may be acceptable when each operation is considered individually but are unacceptable when the cumulative impact is assessed.

The objective of a CHIA document is to:

1. Identify the Cumulative Impact Area (CIA) **(Part II)**
2. Describe baseline conditions in the CIA; identify hydrologic systems, resources and uses; and document baseline conditions of surface and ground water quality and quantity **(Part III)**
3. Identify hydrologic concerns **(Part IV)**
4. Identify relevant standards against which predicted impacts can be compared **(Part V)**
5. Estimate probable future impacts of mining activity with respect to the parameters identified in 4 **(Part VI)**
6. Assess probable material damage **(Part VII)**
7. Make a statement of findings **(Part VIII)**

This CHIA complies with the federal Surface Mining Control and Reclamation Act of 1977 (SMCRA) and subsequent federal regulatory programs under 30 CFR 784.14(f), and with Utah regulatory programs established under Utah Code Annotated 40-10-et seq. and the attendant State Program rules under R645-301-729.

II. CUMULATIVE IMPACT AREA (CIA)

Reviewing Permit Application Packages (PAPs) and Mining and Reclamation Plans (MRPs) alone is not sufficient to assess impacts to the geologic and hydrologic regimes. Specific knowledge of the geology and hydrology is crucial in assessing the dynamics and interactions of chemistry, surface- and ground-water movement, and surface disturbance and subsidence impact associated with the mine sites. The Division uses pertinent information from many sources, including federal and state agencies; geological and hydrological reports; textbooks and other publications; site visits; and a knowledge base built on experience and training.

Plate 1 depicts the location of the Quitcupah/Muddy Creek drainage area relative to the southeast/central portion of the State of Utah. Plate 2 delineates the CIA for current and projected mining in the Quitcupah/Muddy Creek area. The CIA boundary encompasses approximately 95 square miles. It is bounded on the south by Quitcupah Creek and Convulsion Canyon, from a point where Quitcupah Creek crosses State Highway 10, northeast to a point east of Christensen Wash, along Christensen Wash to the ridge that lies east of Rock Wash Canyon, then along the ridge to Muddy Creek. It proceeds northwest along the northeast side of Muddy Creek and along the South Fork of Muddy Creek. The CIA boundary then ranges south along the drainage divide separating Skumpah Canyon drainage from the Quitcupah Canyon drainage from White Mountain south to the ridge dividing Collier Hollow and into Convulsion Canyon to join Quitcupah Creek.

The SUFCO Mine's existing permitted coal leases generally comprise three major tracts: the Quitcupah Tract, the Pines Tract, and the SITLA Muddy Tract (Plate 2). The addition of the WLM tract will add an additional 9% acreage to the existing mine lease area. The physiographic setting of the WLM consists of an upland plateau truncated to the south and southeast by the steeply eroded Convulsion and East Spring Canyons. This upland plateau is dissected by a series of valleys predominantly trending northwest/southeast including Duncan Draw, Mud Spring Hollow and Pin/Broad Hollow. Surface topographic relief in the WLM ranges from 7,200 feet in Convulsion Canyon up to 9,251 feet at the summit of Duncan Mountain. The general slope of the land is reported to the south/southeast.

A small part of the northeast portion of the Pines Tract extends across the Muddy Creek drainage and outside the CIA. The coal seam ends in the escarpment south of the creek, so the CIA should include all impacts. The mine facilities are located within the Quitcupah Tract. Mining activities in the Pines and SITLA Muddy Tracts take place underground with no planned breakouts or surface disturbances.

HISTORY OF MINING

The Convulsion Canyon Mine commenced operation in 1941, mining federal owned coal. Projected life of the SUFCO Mine is estimated to be about 5 years. The SUFCO permit area encompasses a total of 27,605.17 acres that includes 24,775.66 acres of Federal coal leases, 2,134.19 acres of State of Utah coal leases, 640 acres of fee coal leases, the 40-acre waste rock disposal site, and 15.32 acres under U.S. Forest Service special use permit. Most of the mine and coal processing facilities are located in the Quitichupah Creek drainage, in East Spring Canyon. A coal refuse pile is located approximately 5.3 miles west of the mine facilities. Primary and secondary sedimentation ponds are located in East Spring Canyon directly below the mine facilities where disturbed area flow drops down a steep slope to get to the pond. A buried sewage septic system in lower East Spring Canyon treats all mine sewage. In September 2010, the Permittee submitted an amendment to reduce the permit area of the mine to only the disturbed portions, which total 48.43 acres over the life of the mine. Currently, only 28.43 disturbed acres are to be reclaimed.

The majority of coal will be extracted using continuous miner and longwall mining methods. Mining is taking place in only one coal seam, the Lower Hiawatha. Coal is moved by underground conveyor from the face to the portal and facilities in East Spring Canyon where it is loaded into trucks. Table 1 presents the annual production in millions of tons of the SUFCO mine from 1983 to 2010. The production values were obtained from the Utah Geological Survey (Coal Production and Recoverable Reserves in Utah by Coal Mine 2001-2010). Currently, the SUFCO Mine is the highest producing coal mine in the State of Utah. The mine is estimating that their advancement of longwall panels into the WLM area will occur in November 2011.

Table 1 ANNUAL PRODUCTION IN THOUSAND SHORT TONS SUFCO MINE	
Year	Production
2001	7,001
2002	7,600
2003	7,126
2004	7,568
2005	7,567
2006	7,908
2007	6,712
2008	6,946
2009	6,748
2010	6,600*
Estimated Recoverable Reserves Under Lease	66,200

*Forecasted

III. HYDROLOGIC SYSTEM and BASELINE CONDITIONS

Elevations range from less than 5,000 feet in the lower reaches of Muddy Creek to approximately 9,250 feet in the upper plateau escarpments in the Quitcupah/Muddy Creek CIA (Plate 2). Predominant features that exist in the CIA are sandstone cliffs, narrow steep canyons, valleys, highly exposed rock formations and an extensive fracture system. Drainage in the CIA is characterized by the two major drainage systems of Quitcupah and Muddy Creeks which are perennial streams with headwaters that originate at elevations of 7,500 to 9,000 feet.

Surface-water resources in the CIA consist of streams and man-made stock watering ponds. Most of the stream flow is attributed to runoff from snowmelt or rain. Spring flow contributes the most to the base flow of the streams in later summer and fall months. Streams appear to be perennial for most of their length, but the low flows that emanate from springs in the upper reaches leave some to question if the streams are instead intermittent.

Ground-water resources consist of springs and a mine-water discharge. The ground-water patterns have been analyzed and their flow patterns are discussed in the following sections. The latest information used to make a finding of the ground-water patterns was compiled by Mayo and Associates and Petersen Hydrologic, Inc. for the SUFCO Mine. Data were collected at springs, wells, in-mine flows, and a mine discharge site. A previous water resource study was conducted by the U.S. Geologic Survey (Thiros and Cordy, 1991).

GEOLOGY

The geology of the CIA consists of stratigraphic units of rock ranging in age from Late Cretaceous to Tertiary (Eocene) as seen in Table 2 and Plate 3. The oldest exposed rocks include members of the Mancos Shale. The Mesaverde Group overlies the Mancos Shale and consists of the Star Point Sandstone, Blackhawk Formation, Castlegate Sandstone, and Price River Formation. Overlying the Mesaverde Group in the CIA is the North Horn Formation, a member of the Wasatch Group of Paleocene to Eocene age. Unconsolidated deposits formed by weathering and erosion exist as soils, terrace deposits and gravels along canyon streams, and pediments at the base of escarpments. The geology and the general hydrologic properties of each of these formations are described herein:

Structure

There are no major disconformities. Dip is approximately 2° to the northwest due to the rise of the San Rafael Swell located to the southeast. North-south oriented faults are common in the Wasatch Plateau. At least 200 feet of offset on one of these faults formed the closed basin that holds Accord Lakes, located 6 miles southwest of the SUFCO Mine. Lisonbee Spring issues from this fault. Offsets on bounding faults of the Joes Valley graben lies only a few miles east of the SUFCO Mine and approach 1,000 feet.

Neither Spieker (1931), Doelling (1972), nor Thiros and Cordy (1991) mapped any faults within the CIA between the Accord Lakes fault and Joes Valley graben. A group of ten echelon normal faults have been mapped between East Spring Canyon and Duncan Mountain: vertical offsets are indicated on Plate H-II of Appendix 7-2 of the MRP as being greater than 2 feet. Another group of parallel faults, located north of Duncan Mountain, is shown between the South and North Forks of Quitcupah Creek on Plate 6-1: the basis for mapping these faults is unknown but is assumed to be photo geology. Two short faults mapped near the head of Box Canyon were encountered in the mine, but may not show at the surface. Strike of all these faults is approximately $N 25^{\circ} W$ to $N 30^{\circ} W$. Major faulting has not been identified in the WLM area (Petersen, 2010).

Most faults within the SUFCO Mine have displacements of less than a foot, but a fault encountered near Duncan Draw had 16 feet of displacement (oral communication from Chris Kravits, mine geologist, reported by both Thiros and Cordy (1991), and Mayo and Assoc. (1997)).

Fractures measured in the SUFCO Mine strike generally $N 26^{\circ} W$. Fractures observed in the Castlegate Sandstone, Blackhawk Formation, and Star Point Sandstone are oriented $N 20^{\circ} W$ to $N 27^{\circ} W$, and strongly influence surface drainage development. Orientation of a secondary set of fractures, measured at a Castlegate Sandstone outcrop centered on $N 65^{\circ} E$ (Thiros and

Cordy, 1991). Joints in the Castlegate Sandstone are common and can be traced up to approximately 1,000 feet in length.

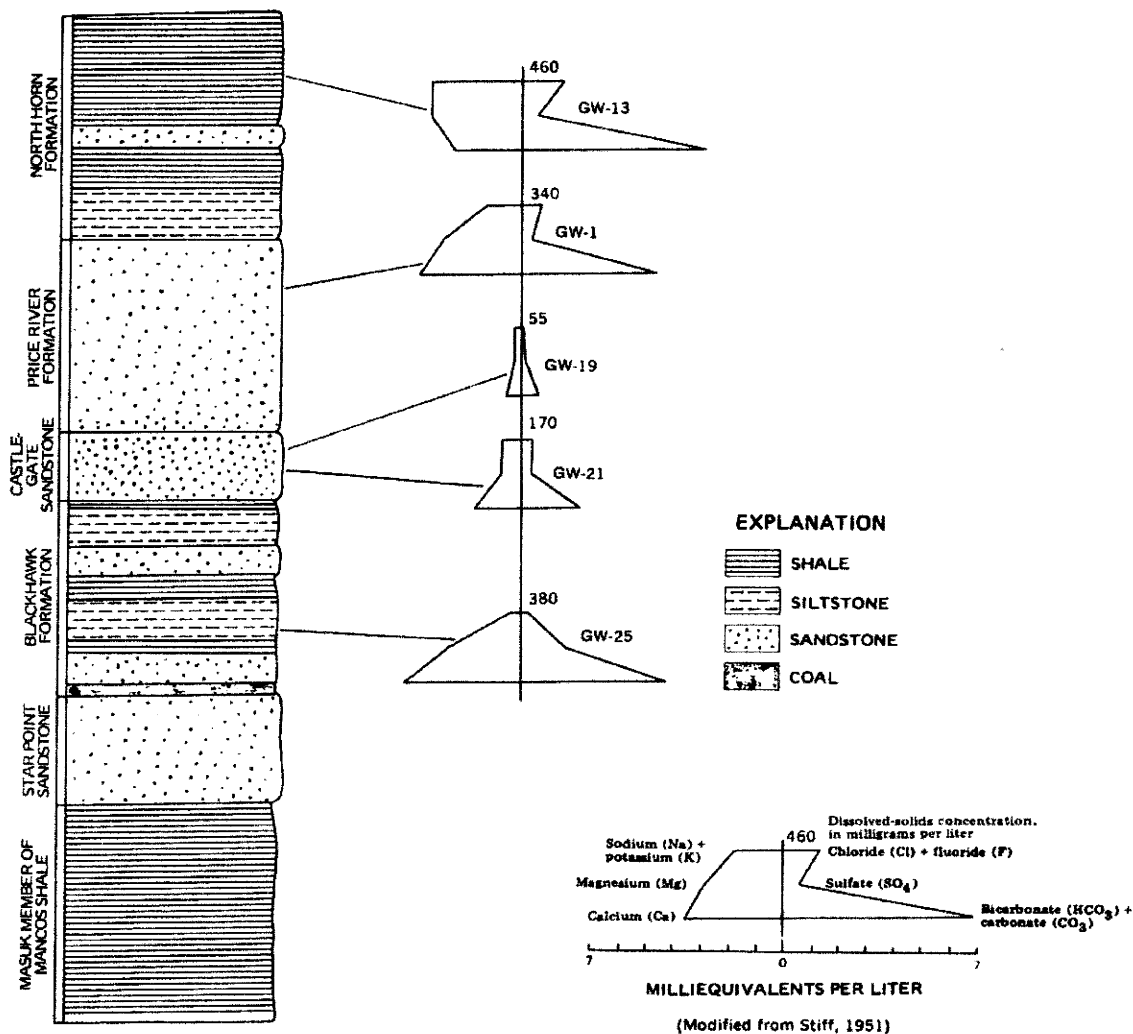


TABLE 2 Generalized stratigraphic column for the study area and representative water-quality diagrams for selected units.

(Adopted from Thiros and Cordy, 1991)

North Horn Formation

The North Horn Formation is a variegated, slope-forming shale unit with minor

sandstone, conglomerate and freshwater limestone. The North Horn Formation is of late Cretaceous – Early Tertiary age and outcrops in the west/northwest portion of the CIA and present at the surface on Duncan Mountain. The reported thickness of the North Horn Formation in the general CIA area was reported to be approximately 400 feet. Groundwater movement through this unit is considered minimal due to the pervasiveness of the low-permeability of the shale horizons. Groundwater transport is primarily through fractured or weathered zones that may percolate to the underlying Price River Formation but it is not considered appreciable.

Price River Formation

The upper member of the Price River Formation consists of medium- to coarse-grained sandstones, interbedded shale, and thin beds of conglomerate deposited in a fluvial environment. The Price River Formation Member is approximately 550 feet thick and is the predominant rock unit representing the land surface in the CIA. The Price River Formation has been reported to have the capability of transmitting water but is limited by the lenticular geometry of the sandstone units which prohibit it from traveling significant distances. Because this unit represents the land surface in the majority of the CHIA, recharge to this unit from precipitation and snowmelt would be heavily influenced by climate conditions.

Castlegate Sandstone

The Castlegate Sandstone is a formation consisting of massively bedded coarse-grained sandstone that formed in a braided fluvial depositional system. The Castlegate has been described as a formation that is sufficiently permeable to transport appreciable groundwater but the discontinuity of interbedded lithologies of mudstone, shale, and sandstone limit its ability to transmit water over significant distances. Therefore long, regional flow systems do not generally develop in the Castlegate Sandstone (Petersen 2010). Low discharge rates from springs and lack of water in some drill-holes and wells are further evidence that an extensive groundwater system is not present in the Castlegate. Ground-water systems that feed Castlegate springs are localized, and recharged on the plateau. Spring discharge hydrographs show flow is strongly dependent on precipitation and snowmelt. Flow is through fractures and intergranular spaces in weathered rock. Near cliff faces and along stream bottoms, the Castlegate Sandstone becomes friable and more able to transmit ground water due to dissolution of carbonate cement.

Blackhawk Formation

The upper Blackhawk Formation is dominantly massive, fine- to medium- grained sandstones, siltstones, mudstones and shales deposited in deltaic and floodplain environments. These sandstones are separated vertically and laterally by overbank and interdeltic deposits of shale and mudstone. Sandstone decreases towards the base of the Blackhawk and the sandstone units become even more separated and isolated. Swelling clays throughout the Blackhawk decrease the effectiveness of fractures as conduits for water. Because of the lateral and vertical discontinuity of the sandstone horizons, the potential for movement of groundwater is limited in

the Blackhawk Formation.

Mining operations are restricted to the lower Blackhawk Formation, where the main coal seam is the Upper Hiawatha averaging approximately 7 feet thick and is known to directly overlay the Star Point Sandstone. The Upper Hiawatha seam is the coal to be mined in the WLM area. The Lower Hiawatha Seam is thick enough and is separated from the Upper Hiawatha by sufficient interburden to allow it to be mined in the western portion of the Quitichupah tract. The Duncan Seam, above the Upper Hiawatha, is of minable thickness over only 50 acres, so it is not economical to mine. Overburden thickness over the Upper Hiawatha ranges from approximately 600 feet to 1,800 feet and averages 800 feet. Large areas where coal seams have burned and fired the rock to resistant, reddish clinker are exposed in the canyon walls. The Blackhawk Formation is well exposed in the cliffs of Convulsion Canyon.

Star Pointe Sandstone

The Star Pointe sandstone is described as an interbedded sandstone, siltstone and shale deposited in a prograding, near shore beach environment. The thickness of the Star Point Sandstone averages about 280 feet and found throughout the lease area. The lower portion of the formation intertongues with the underlying Masuk Member of the Mancos Shale. Groundwater flow in the Star Pointe sandstone is primarily transported through joints and fractures.

Mancos Shale, Masuk Member

The Masuk Member of the Mancos Shale is described as a blue-gray fissile claystone or silty claystone that weathers to a light blue-gray to light tan. The unit forms steep, barren, easily erodible slopes. The Mancos shale is a deep marine shale unit considered to be a confining layer due to its poor water transmitting properties due to its high clay content.

REGIONAL AQUIFER

Regional aquifer is a phrase commonly used by mine operators in the Book Cliffs and Wasatch Plateau coal fields. In such usage, regional aquifer usually refers to any water found in the Star Point Sandstone and Blackhawk Formation irrespective of quality, quantity, use, storage, flow and transport, and discharge. In preparing this CHIA, the Division has adhered to the definition of *aquifer* as found in the Coal Mining Rules (R645-100-200), and the term regional aquifer has been deliberately used or avoided, as appropriate, throughout this CHIA. Although there are local perched and fracture-related aquifers in the Quitichupah/Muddy Creek CIA, the quality, quantity, use, storage, flow and transport, and discharge of ground water do not indicate the presence of a regional aquifer or aquifer system. After evaluating the geologic and hydrologic evidence, the Division does not consider the saturated strata in the Star Point, Blackhawk and associated formations in the East Mountain CIA to be a regional aquifer.

HYDRAULIC CONDUCTIVITY AND PERMEABILITY

In sedimentary rocks, there is a wide range of textures or fabrics that determine the hydraulic characteristics of the unfractured medium. These textures or fabrics are related to the mineralogy or composition of the sediments, the range of sizes of the sedimentary particles (sorting), the spatial distribution of different sediment-sizes (grading), the shape and spatial orientation or arrangement of the sediment particles after compaction (packing), cementation, and properties acquired or altered as and after the sediments were lithified. Lateral and vertical variations in these characteristics can create internal low-permeability zones or barriers, so that a unit that to the eye appears to be very uniform and to have aquifer characteristics can actually be incapable of storing or transporting water in any significant amount. Such vertical and lateral inhomogeneities are common within sandstone units of the Blackhawk and Price River Formations and in the Star Point Sandstone. One important observed characteristic of groundwater that discharges to the mine workings from the Blackhawk formation is that there is no indication of seasonal variation, which may indicate that the source of the water is not dependant on climate. This provides a line of evidence that the groundwater in the Blackhawk formation is hydrologically isolated from modern-aged groundwater from the active system aquifer found in the upper strata of the North Horn, Price River, and Castlegate formations.

Based on slug tests and determinations from core samples, hydraulic conductivity of the Star Point Sandstone is typically low, so movement of ground water through the unfractured sandstone is slow and unfractured Star Point Sandstone is not generally considered to be an aquifer. However, hydraulic conductivity values within the Star Point Sandstone vary through several orders-of-magnitude, and unfractured units in the Star Point Sandstone can locally transmit sufficient ground water to sustain small springs or wells. (As a very general rule-of-thumb, aquifers have hydraulic conductivities of 10^{-5} cm/sec or greater.) Strata above the Star Point Sandstone have hydraulic conductivities that are generally as low as or lower than those in the Star Point Sandstone.

SWELLING CLAYS

The interbedded claystones, siltstones, and sandstones of the Wasatch Plateau are rich in swelling clay minerals of the montmorillonite or smectite group. Swelling clays absorb water and expand to as much as 150 percent of their dry volume. These swelling clays reduce the hydraulic conductivity of the rock or soil that contains them and contribute to the rapid closing or healing of tension fractures that result from subsidence. Genwal Resources, Inc. examined six shale and siltstone samples from the Blackhawk Formation in the East Mountain region of the Wasatch Plateau located approximately 25 miles northeast of the Quitichupah/Muddy Creek CIA. The samples were analyzed by X-ray diffraction and cross-polarized light microscopy and it was found the samples contained 3 to 34 percent smectitic clays, with an average of 24 percent. Siltstones and shales in the Castlegate (three samples) averaged 19 percent smectitic clay, and the Price River Formation (three samples) 15 percent. Non-swelling clays, which also inhibit

ground-water flow, constituted an additional 1 to 6 percent of the rock volume (Crandall Canyon Mine MRP, App. 7-41).

CLIMATE

In the Quitcupah/Muddy Creek CIA, temperatures are elevation dependent and range from 32^o to 90^o F in the summer and -10^o to 40^o F in the winter. Prevailing winds are from the west and northwest. Annual precipitation ranges from 10 inches per year at lower elevations to more than 20 inches per year at higher elevations. Approximately half of the total annual precipitation falls during localized thunderstorm events from July through November (Thiros and Cordy, 1991).

The Palmer Hydrologic Drought Index (PHDI) indicates long-term climatic trends for the region. The PHDI is a monthly value generated by the National Climatic Data Center (NCDC) that indicates the severity of a wet or dry spell. The PHDI is computed from climatic and hydrologic parameters such as temperature, precipitation, evapotranspiration, soil water recharge, soil water loss, and runoff. Because the PHDI takes into account parameters that affect the balance between moisture supply and moisture demand, it is useful for evaluating the long-term relationship between climate and groundwater recharge and discharge. The Quitcupah/Muddy Creek CIA straddles the boundary between PHDI Regions 4 and 7 and is near Region 5. Figure 1 shows the PHDI for 1981 through 2010. Overall, the area has been experiencing short mild wet spells up to moderate drought conditions since 2007.

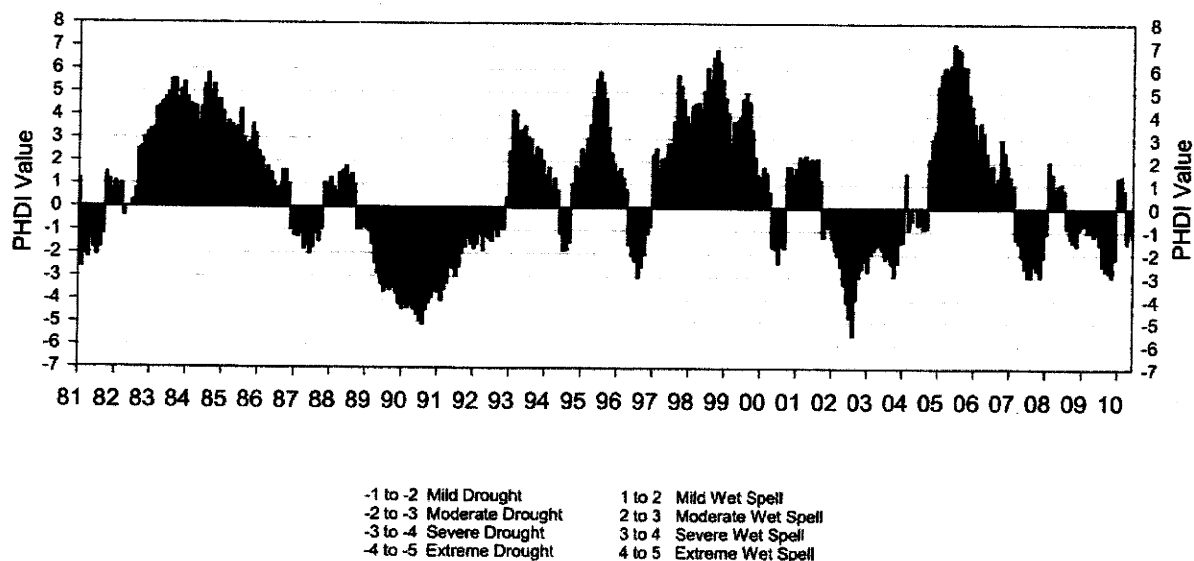


Figure 1 - PHDI, Division 4

HYDROLOGY

As part of the SUFCO mining and reclamation plan (MRP), SUFCO has implemented a baseline and operational surface- and ground-water monitoring program for their permit and adjacent areas. The locations of the water monitoring sites are shown on Plate 4. Several studies have been conducted within the CIA in order to assess hydrologic conditions and potential effects due to coal mining in the area. These studies include Thiros and Cordy, 1991, Mayo and Associates, 1997, Mayo and Associates, 1999, Pines Tract Final Environmental Impact Statement, 1999, Cirrus Ecological Solutions, 2004, and Petersen Hydrologic, 2005 and 2010. Information presented in these studies is used to describe baseline hydrologic conditions for the CIA.

Ground Water

Groundwater systems identified in the Quitichupah/Muddy Creek region appear to fall under two distinct aquifer systems. A shallower aquifer system has been identified that is responsible for recharging the strata that makes up the North Horn, Price River and Castlegate formations. Once recharge enters the ground, the rate and direction of ground-water flow is governed mainly by gravity and geology. Lateral ground-water flow dominates in the gently dipping Tertiary and Cretaceous strata of the Wasatch Plateau, where layers of low-permeability rock that impede downward movement are common. Both lateral and vertical flow may be channeled through faults and fractures, but plastic or swelling clays that can seal faults and fractures are present. Ground-water movement is controlled mainly by fractures, dip of the beds (dip is approximately 2 degrees to the northeast) and hydraulic conductivity of the strata.

Ground water tends to flow more readily through shallower systems where weathering and fracturing produce hydraulic conductivities that are generally larger than in deeper systems. Much of the ground-water flow continues both laterally and downward through these shallower, local systems until it intercepts the surface and is discharged at a spring or seep, enters a stream as baseflow, is transpired by vegetation, or simply evaporates to the atmosphere. However, some of the ground water follows deeper and slower flow-paths where it becomes isolated from the surface and is, in effect, stored.

The underlying Star Point Sandstone and Blackhawk Formation have been identified as containing a deeper aquifer system where isolated perched groundwater reservoirs have been identified. These perched aquifer systems vary in terms of volume of water stored and magnitude of flow. Isotopic analysis of these groundwater systems have found that the groundwater does not display any characteristics of a modern-aged groundwater system indicating that groundwater is not readily recharged by any groundwater contained within the overlying strata of the Castlegate, Price River, or North Horn formations. These strata of the Mesaverde Group do not readily receive recharge from surface water because they are dominantly low-permeability claystones and siltstones. Large volumes of these rocks may be unsaturated or even dry. Sandstone aquifers occur where there is sufficient intergranular

porosity and permeability in lenticular fluvial-channel and tabular overbank deposits. The sandstones are laterally and vertically discontinuous and pinch-out over short distances, and individual sandstone units are poorly interconnected, isolated by claystones and siltstones. However, these sandstones, especially where fractured, can produce significant ground-water flows from local systems.

Numerous springs and seeps have been identified by the various studies conducted within the CIA. Twenty-seven springs have been selected to be monitored as part of the SUFCO Mine groundwater monitoring program. The springs were selected as representative of the permit and surrounding area from baseline data and information provided in the PHC determinations of the SUFCO MRP (Appendices 7-17, 1-18, 7-20 and 7-24). The monitored springs are identified with their respective stratigraphic units on Table 3. More springs and seeps appear along northeastern escarpments, which is consistent with the concept of ground water following the dip slope. There is general agreement among the studies that aquifer recharge is principally by snowmelt and precipitation seeping into bedrock.

In many of the areas of the permit, the exposure of sandstone units and fractures provides a mechanism for ground-water recharge to the Castlegate Sandstone. The Blackhawk Formation contains layers of low-permeability rock units such as shales and clays that can impede downward movement of ground water. Many of the springs and seeps found in the CIA issue from the base of the Castlegate Sandstone due to the perched effect caused by the Blackhawk Formation.

Table 3
Spring Information – SUFCO Groundwater Monitoring Plan

Formation	Spring Name		Flow (gpm)			Monitoring Period	Notes
	SUFCO	USGS ¹	Average	Max	Min		
North Horn Formation	GW-13	GW-13	0.55	1.8	0.002	1986 ¹ ; 1989-1995 ² ; 1995-2009 ⁶	
	057A	GW-5	0.34	3.37	0.0	1978 ¹ ; 1987-1995 ² ; 1988-2009 ⁶	Duncan Draw spring
	M-SP08		0.39	1.19	0.0	1980-2009 ⁶	
	M-SP53		0.1	0.27	0.06	2006-2009 ⁶	
Price River Formation	M-SP01	GW-1	0.9	0.48	0.2	1976, 1979, 1986, 1987 ¹ ; 2006-2009 ⁶	Rough Brothers spring
	M-SP02	GW-2	2.84	50.0	0.0	1976, 1987 ¹ ; 2006-2009 ⁶	Estimated maximum flow
	M-SP18		0.3	0.65	0.06	2006-2009 ⁶	
	M-SP39		1.3	2.04	0.64	2006-2009 ⁶	
	Mud Spring		0.0	0.0	0.0	2007-2010 ⁵	
Castlegate Sandstone	089		NA	NA	NA	1989-1995 ² ; 1997-2009 ⁶	Pool with stage gage
	GW-20	GW-20	0.4	13.0	0.0	1986 ¹ ; 1998-2009 ⁶	
	GW-21	GW-21	0.48	2.3	0.0	1979-1987 ¹ ; 1995-2009 ⁶	Link Canyon spring
	Pines 100		0.3	0.96	0.03	1997-1999 ³ ; 2000-2009 ⁶	
	Pines 105		3.45	10.0	0.0	1997-1999 ³ ; 2000-2009 ⁶	
	Pines 218		0.02	0.1	0.0	1997-1999 ⁴ ; 2000-2009 ⁶	
Blackhawk Formation	Broad Hollow Spring		<0.25	0.25	<0.1	2007-2010 ⁵	
	001	GW-12	1.63	7.3	0.16	1980, 1986, 1987 ¹ ; 1983-1995 ² ; 1982-2009 ⁶	
	Pines 206	GW-14	2.37	3.9	1.5	1986 ¹ ; 1997-1999 ³ ; 1999-2009 ⁶	
	Pines 209	GW-15	9.08	14.6	5.6	1986 ¹ ; 1997 ³ ; 2000-2009 ⁶	
Star Point Sandstone	Pines 212		5.5	8.7	3.14	1997-1999 ⁴ ; 2000-2009 ⁶	
	Pines 214		1.19	3.21	0.14	1997-1999 ⁴ ; 2000-2009 ⁶	Impacted by subsidence
	Pines 303		1.3	0.88	0.0	1997-1999 ⁴ ; 2000-2009 ⁶	
	047		26.2	56.3	0.1	1983-1995 ² ; 1996-2010 ⁶	Pump House spring

Sources for monitoring periods: 1 = Thiros and Cordy, 1991; 2 = Mayo and Associates, 1997 (MRP Appendix 7-17);

3 = Mayo and Associates, 1999 (MRP Appendix 7-17, Addition);

4 = Mayo and Associates, 1999 (MRP Appendix 7-18);

5 = Citrus, 2004 and Petersen Hydrologic, 2005, 2010 (MRP Appendix 7-20 and 7-24); and

6 = SUFCO water monitoring program (DOGM database).

Both lateral and vertical flow can be channeled through faults and fractures. Typically ground-water flow continues both laterally and downward until it intercepts the surface and is discharged as a spring or seep or enters a stream as baseflow. This scenario is more likely in the Star Point, Price River, and Castlegate Units. The coal bearing units are found in the Blackhawk Formation that underlies the Castlegate Sandstone. The Blackhawk Formation contains interbedded sequences of sandstones, siltstones, shales, mudstones, and coal. The previous statement does have exceptions, and there are undoubtedly some fractures and faults in the Blackhawk that do transmit volumes of ground water to the mine or springs.

Analysis of ground-water chemistry has been evaluated by Mayo and Associates (1999) in the Pines Tract Final Environmental Impact Statement (FEIS, 1999) and Petersen Hydrologic LLC 2010 in the WLM. In the Pines area, it appears that recharge to springs in the Box Canyon tributaries is derived primarily from the area extending 1,000 feet back from the canyon rims. Erosion of the canyons has reduced both vertical and lateral - or confining - stresses on the adjacent canyon walls, which has allowed rotation of blocks of fractured Castlegate Sandstone and widening of fractures and created more storage and conductivity for ground water. In the WLM area, TDS levels average between 200 and 750 mg/L and vary considerably in solute compositions depending upon the geologic formations groundwater and surface water is discharging from.

Mayo and Associates have proposed a hydraulic disconnect between in-mine waters and near-surface ground water based on data from isotopic evaluation. Dr. Allen Mayo is considered a leading authority on isotopic dating of water resources by mining operators, and has identified the ground-water regimes of several mines on the Wasatch Plateau. Studies conducted by his firm are specialized. Analysis of the ground water by Mayo and Associates using tritium analysis and carbon dating reveals the mine waters to be very old (greater than 7,000 to 20,000 years) as compared to meteoric waters that replenish the near surface waters (Mayo and Associates, 1999, and FEIS, 1999). "The cause of this disconnect is attributed to shale and mudstones in the Blackhawk Formation that hinder the downward migration of water" (FEIS, 1999). Dr. Mayo has concluded, "ground-water should not be diverted from the Castlegate Sandstone into the Blackhawk Formation".

Carbon¹⁴ analysis was conducted on spring sample SUFCO 057A in Duncan Draw, which is located just outside the northwest boundary of the WLM area. Carbon¹⁴ results from the groundwater originating from this spring indicated that anthropogenic carbon was present in the sample indicating a modern-age component of the groundwater. Tritium analysis of SUFCO 047, which discharges from the Starpoint Sandstone below the surface facilities in East Canyon indicated a Carbon¹⁴ result indicative of a 7,300 year residence time of the groundwater. Tritium analysis was also used to qualitatively age-date whether or not the groundwater has a modern-aged recharge component (greater than 10 NTUs). Tritium analysis measures the amount of atmospheric tritium present in the groundwater, as a result of atomic weapons testing that occurred in the mid-20th century. Spring 001 that discharges in East Spring Canyon and SUFCO

057A both yielded a high tritium result indicative of modern-aged groundwater.

MINE INFLOW

Mean residence time ("age") of ground water in the Pines, SITLA Muddy Tracts, and the WLM have been determined using Carbon¹⁴ (radiocarbon dating) and tritium (³H). Most near-surface systems contain abundant tritium and anthropogenic radiocarbon and are recent or modern, the greatest mean residence time being 4,000 years according to radiocarbon dating. Ground waters in the mine have a mean residence time of 7,000 to 20,000 years and contain no tritium. From these data, Mayo and Associates determined that the near-surface ground-water systems are disconnected from ground-water systems encountered in the mine, abundant shale and mudstone of the Blackhawk Formation hindering the downward migration of water.

Most water entering the mine comes through inflows from perched aquifers in the mine roof and occasionally through mine floor seeps. As the mine-face progresses, the leaks generally dry up as the perched aquifers drain. However, some leaks remain or become seeps and continue to contribute to the mine inflow. Underground mining activities in the WLM area will likely intercept ancient or "in-active" groundwater systems likely from overlying sandstone channels and possibly fault zones that could be intercepted. Mining activities will likely dewater these ancient perched systems as it has in other areas of the SUFCO mine. These systems have been demonstrated to not be in good hydraulic communication with the overlying active groundwater system and therefore not considered to have any impacts to surface water systems.

Movement of water within the mine is managed by sumps, pumps and piping, free flow along the mine floor, and storage into gob areas for settlement. Water not used in the mine or lost to evaporation is discharged to the North Fork of Quitichupah Creek through UPDES permitted outfall 003A. (Before September 1982, mine water was discharged into East Spring Canyon.) Daily average discharge rates for each month are reported to the Division and Utah Division of Water Quality (DWQ). Figure 2 shows the monthly average discharge of the SUFCO mine from 2002 through 2010. Average discharge in 1978 was about 200 gallons per minute (gpm). In September 1987, measurements above and below the discharge site revealed a mine discharge rate of 461 gpm. As of the first quarter 2010, the mine is reporting a discharge of approximately 3,200 gpm, or approximately 7.13 cubic feet per second (cfs). Mine discharge rates have increased along with production rates and to a lesser extent, the size of the mine (Table 4 and Figure 3). Discharge has increased the base flow to the North Fork of Quitichupah Creek.

Figure 2 – SUFCO Mine Water Discharge History

Annual Minewater Discharge Rates (gpm) from UPDES 003A to the North Fork of
Quitchipah Creek

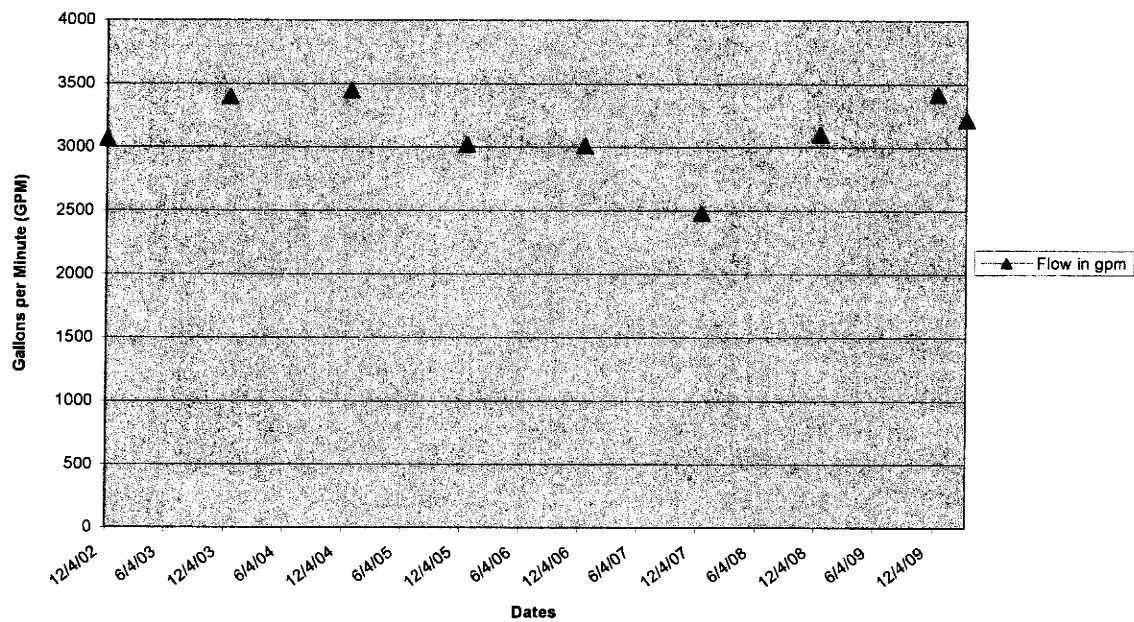


Table 4
Annual Coal Production and Mine Water Discharge
SUFCO Mine

Year	Annual Coal Production (million tons)	Annual Discharge (millions of gallons)	Discharge per Coal Production (gallons/ton)	Notes
2010	6.6	1,690	256	
2009	6.7	1,797	268	
2008	6.9	1,630	236	
2007	6.7	1,305	195	
2006	7.9	1,582	200	
2005	7.6	1,586	208	
2004	7.6	1,816	239	
2003	7.1	1,738	244	
2002	7.6	1,427	188	
2001	7.0	810	116	
2000	5.9	1,193	202	
1999	5.8	897	156	
1998	5.7	699	122	
1997	4.9	753	152	
1996	4.6	760	164	
1995	3.9	636	163	March 1994 to March 1995 - substantial flow diverted to the 3 rd West area.
1994	3.6	276	77	
1993	3.6	518	146	
1992	2.6	505	196	
1991	3.1	434	141	
1990	2.9	389	135	
1989	3.1	576	188	November 1987 to August 1989 - flow underestimated because of a change to the weir setting.
1988	2.6	247	94	
1987	2.2	515	231	
1986	2.4	513	217	
1985	1.8	533	299	
1984	2.1	412	192	
1983	2.2	259	116	

Discharge data from SUFCO DMRs

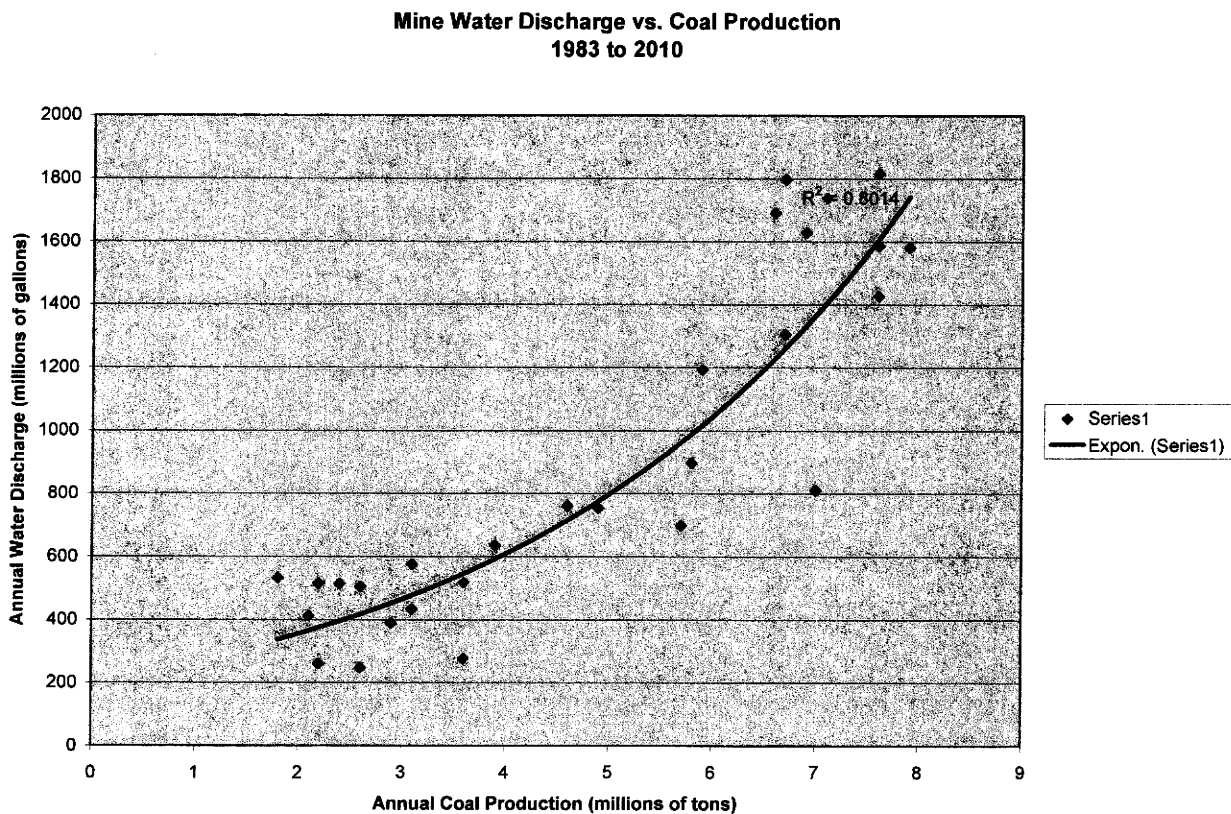


Figure 3 – SUFCO Mine Water Discharge vs Coal Production

Ground-water Quality

A generalized ground-water quality data summary of the CIA is presented in Table 5. The data was compiled from the PHC determinations presented in the SUFCO MRP (Appendices 7-16, 7-17, 7-20, and 7-24).

Average total dissolved solids (TDS) concentrations for springs in the CIA range from 140 to 722 mg/L. Concentrations of TDS are lowest in springs of the Castlegate Sandstone, averaging well under 200 mg/L, because there are few soluble minerals in the Castlegate Sandstone. The waters are under saturated with respect to carbonate minerals, which along with the low TDS, indicates that recharge takes place where soil zone CO_2 is low. This is most likely the exposed, relatively barren Castlegate Sandstone surface of the Old Woman Plateau where soil development is poor.

Table 5
Summary of Ground-Water Quality Data
SUFCO Mine

Formation	Tract	# of sites	# of samples	TDS mg/L	Ca ⁺² mg/L	Mg ⁺ mg/L	Na ⁺ + K ⁺ mg/L	HCO ₃ ⁻ mg/L	SO ₄ ²⁻ mg/L	Cl ⁻ mg/L	* Total Anions	* Total Cations
North Horn	West Lease	1	20	322	92	14	12	326	11	14	-	-
	Quitichupah	NA	3	722	79	24	193	431	89	107	-	-
	Pines	0	0	-	-	-	-	-	-	-	-	-
	Muddy	5	25	483	58	36	92	491	24	39	10.8	10.2
Price River	West Lease	7	19	749	116	35	99	359	230	56	-	-
	Quitichupah	0	0	-	-	-	-	-	-	-	-	-
	Pines	0	0	-	-	-	-	-	-	-	-	-
	Muddy	5	25	545	77	38	68	425	82	64	10.1	9.9
Castlegate	West Lease	2	44	264	48	15	27	208	12	17	-	-
	Quitichupah	NA	8	140	23	6	21	94	15	8	NA	NA
	Pines	7	19	163	21	5	9	85	13	9	NA	NA
	Muddy	0	0	-	-	-	-	-	-	-	-	-
Blackhawk	West Lease	0	0	-	-	-	-	-	-	-	-	-
	Quitichupah	NA	17	422	80	41	41	339	90	16	NA	NA
	Pines	9	24	305	56	29	24	273	82	14	NA	NA
	Muddy	0	0	-	-	-	-	-	-	-	-	-
Star Point	West Lease	1	50+	479	89	40	27	392	86	18	-	-

November 15, 2010

Quitichupah/Muddy Creek CHIA

	Quitichupah	2	78	593	100	48	68	406	123	38	NA	NA
	Pines	0	0	-	-	-	-	-	-	-	-	-
	Muddy	0	0	-	-	-	-	-	-	-	-	-

* Total anions and total cations might not balance closely because this table is based on average values.

- = No data available or not applicable.

Ground water from springs that issue from the Blackhawk Formation are similar to those from the Castlegate. Most of these springs are in the upper Blackhawk. Ca^+ and HCO_3^- are the dominant ions in both the Castlegate and Blackhawk. However, the average TDS concentrations in the Blackhawk Formation are approximately 305 and 422 mg/L for the Pines and Quitcupah Tracts, respectively. TDS in samples from in-mine roof drips from the lower Blackhawk Formation averages approximately 400 mg/L. Average TDS concentration reported for mine water discharged at UPDES outfall 003A is approximately 777 mg/L. The higher TDS concentration for mine water is likely due to the longer residence time of water encountered in perched aquifers not in direct communication with surface-water recharge zones. Recharge to the Blackhawk appears to be downward percolation from the Castlegate Sandstone.

TDS levels in ground waters flowing from the overlying North Horn and Price River Formations and the underlying Star Point Sandstone are higher, averaging greater than 550 mg/L. Dominant ions in these formations are Na^+ and HCO_3^- in the North Horn and Ca^+ and HCO_3^- in the Star Point. Dominant ions of the Price River Formation are sodium, bicarbonate, and sulfate. Calcite and clay minerals with exchangeable sodium probably produce this sodium enriched water (Thiros and Cordy, 1991).

Wells WRDS-B3, WRDS-B5, WRDS-B6, WRDS-B8, and WRDS-B9 monitor water quality at the waste rock disposal site (WRDS). They are completed in the upper Price River Formation. TDS concentrations are high, averages in the different wells ranging from 1,700 mg/L to 6,200 mg/L. Concentrations increase down gradient beneath the WRDS, a condition that predates construction of the site.

The waters are of mixed composition, no ions dominating consistently. There is some indication of seasonal variation, but data are insufficient to make a valid determination. Only a small amount of water-quality data has been collected from the other wells around the SUFCO Mine because these wells were intended mainly to monitor water levels.

SURFACE-WATER

Quitcupah and Muddy Creeks, both perennial streams, are the two major drainages in the CIA. East Spring, Greens, Box, and Wash Rock Canyons and Wileys Fork are the source of small perennial, intermittent or ephemeral streams that feed Quitcupah and Muddy Creeks (Plate 4 and Table 4). The small draws that feed these canyons streams are numerous and some originate as springs, which continue to flow perennially but most often filter into the surrounding channel deposits. Most springs on the CIA emit low volumes.

Snowmelt is the major source of water for the perennial streams of the Quitcupah and Muddy Creek Basins. Intermittent and ephemeral tributaries are abundant, existing primarily at lower elevations where potential evapotranspiration exceeds precipitation. Intense summer thunderstorms may cause short-term flooding, but not large volumes of runoff.

Water use in the higher elevations of the Muddy Creek drainage basin is primarily for wildlife and stock watering purposes, although they tend to be low yielding springs and streams. The upper watershed provides most of the domestic water needs for the lower valley. Within the lower valley area, agricultural activities utilize some of the water. Minimum flows in the gauged streams and rivers in the basin occasionally reach zero. During warm snow melts and heavy rain storms erosion takes place and the streams become loaded with sediments especially in the lower reaches where vegetation is sparse and hillsides of the Blackhawk Formation and Mancos Shale are exposed. Storage reservoirs are common at higher elevations.

There are no major reservoirs located within the CIA. Three reservoirs are located adjacent to the CHIA boundary: 1) Julius Flat Reservoir (approximately 725 acre-feet) located northwest of the CHIA, 2) Skumpah Reservoir (less than 500 acre-feet) located west of the CHIA; and 3) Accord Lakes (less than 500 acre-feet) located southwest of the CHIA.

Soil cover varies with slope. There are areas on top of Pines Tract Lease that are bare of soil or only contain a few sparse inches of soil, which reveal the surface and fracture pattern of the Castlegate Sandstone. There are shallow silty soils on the milder slopes and shallow sand-gravel alluvium in the channel bottoms. The soils classify as hydrologic soils group C and D. The infiltration rates of the soil results in moderately low infiltration capacity.

WATERSHEDS

The subdrainage volumes for the Quitcupah Creek and Muddy Creek watersheds are listed on Table 6. Descriptions of the larger subdrainages are presented below.

Quitcupah Creek Drainage

1) East Spring Canyon

East Spring Canyon drainage consists of 5,316 acres. SUFCO's mine and surface facilities are located at the confluence where Mud Spring Hollow and East Spring Hollow connect. About ½ mile below the facilities, East Spring Canyon connects with Convulsion Canyon. Convulsion Canyon runs southeast where it connects with Water Hollow to form the main channel of Quitcupah Creek.

Construction of the mine facilities required extensive cut and fill operations. Average channel gradient of East Spring Canyon is 6.7 %, but 13 % through the facilities area. That makes the outslope of the mine pad very steep. The sedimentation pond sits at the toe of the fill. All disturbed drainage is collected using berms, culverts, and ditches. Runoff from the disturbed area is first run to a sediment basin on the pad to allow sediment and coal fines to settle and to skim most of any oils that are trapped. Any disturbed drainage overflowing the basin runs down a culvert to the sedimentation pond where it is contained and discharged in accordance with requirements under a UPDES discharge permit.

Table 6 Subdrainages of the Quitcupah/Muddy Creek CIA				
Number	Drainage	Square Meters	Acres	Square Miles
QUITCHUPAH CREEK WATERSHEDS				
1	East Spring Canyon	21,545,987	5,324	8.32
2	N. Fork Quitcupah	61,770,925	15,264	23.85
3	Link Canyon	30,921,703	7,641	11.94
4	Christiansen Wash	13,269,195	3,279	5.12
5	Quitcupah Creek Un-named Tributary	6,186,105	1,529	2.39
6	Quitcupah Creek Un-named Tributary	7,671,504	1,896	2.96
7	Quitcupah Creek Un-named Tributary	2,380,927	588	0.92
	TOTAL Quitcupah Creek Watershed	143,746,946	35,521	55.50
MUDDY CREEK WATERSHEDS				
8	Greens Canyon	23,540,156	5,817	9.09
9	Box Canyon	31,514,000	7,787	12.17
10	Wileys Fork	6,624,784	1,637	2.56
11	Wash Rock Canyon	5,663,696	1,400	2.19
12	Muddy Creek Un-named Tributary	15,818,553	3,909	6.11
13	Muddy Creek Un-named Tributary	8,760,269	2,165	3.38
14	Muddy Creek Un-named Tributary	1,691,910	418	0.65
15	Muddy Creek Un-named Tributary	5,362,570	1,325	2.07
16	Muddy Creek Un-named Tributary	2,135,364	528	0.82
	TOTAL Muddy Creek Watershed	101,111,302	24,986	39.04
	TOTAL CIA from Watersheds	244,858,248	60,504	94.54

Undisturbed drainage is routed around the disturbed area using berms, ditches, and culverts. A 60-inch culvert transports streamflow from Mud Spring Hollow and East Spring Canyon under the minepad downstream.

2) North Fork of Quitichupah Creek

The North Fork of Quitichupah Creek drainage consists of 15,212 acres. The North Fork of Quitichupah Creek is a perennial stream that flows in a deep canyon which bisects the Quitichupah Lease. Dry Fork enters Quitichupah Canyon from the northeast about half the length of the canyon. The Main Fork of Quitichupah Creek enters the canyon from the west on its upper end. The Blackhawk Formation forms the steep canyon walls and the Castlegate Sandstone forms the canyon rim.

Thiros and Cordy (1991) conducted a seepage study that identified flow patterns in the canyon. During the study, starting upstream, flow had a quick increase over a short distance in the Price River Formation. There is only a gradual increase through the Castlegate Sandstone. The creek loses flow in the upper Blackhawk Formation, then picks up a minor amount in the lower part of the formation. Flow is substantially increased by the mine breakout discharge (UPDES 003A). Flow is again increased as it flows through the Star Point Sandstone. As the stream flows over the Mancos Shale flow is decreased.

The continuous flows from the mine discharge can be several times the normal flows during drier periods. The increased base flow can and probably has changed some of the channel configuration. Baseline riparian information is not available to verify any changes, however likely changes could be in sediment and bank configuration, change (increase) in riparian zone, and more water for downstream users. A drawback could be that the discharge could cease when mining is finished and reverse changes would take place.

3) Link Canyon

Link Canyon drainage is ephemeral and consists of 7,569 acres. SUFCO has constructed an electrical sub-station in the canyon to supply power for the Pines Tract operations. There are no discharges from the substation breakout and all runoff will be contained on site or treated by way of alternate sediment control measures, berms, and silt fences.

Link Canyon also contains the old Link Canyon Mine. Seepage issuing from the former mine portals has ceased upon SUFCO reopening the west portal as an emergency escape way, ventilation portal, and entry for electrical lines from the Link Canyon substation.

There are two springs in the upper end of the canyon, GW-21 and Pines 100 that are monitored by SUFCO and the Emery County Water Users. The spring flow is diverted into a

trough for cattle, and then flows down the canyon. There is riparian vegetation for the first 100 yards of flow until it seeps into the channel.

Muddy Creek Drainage

8) Greens Canyon

Greens Canyon is a perennial drainage encompassing 5,878 acres. The drainage is split into the Greens Hollow and Cowboy Creek drainages north of the SITLA Muddy Tract. Cowboy Creek is considered a perennial stream that drains the north side of Big Ridge of the SITLA Muddy Tract.

Cowboy Creek flows over the Price River Formation at its headwaters and then cuts steeply into the Castlegate Sandstone and Blackhawk Formation before joining with Green Hollow. The creek flows across the northwest corner of the tract and was monitored at two sites for baseline flow and water quality parameters for the SITLA Muddy Tract PHC determination. Maximum flow of the creek was reported at 717 gpm during the spring of 2004 and baseline flow during the fall ranges between 0 and 3 gpm. Average TDS concentration at the two monitoring sites is reported as 350 and 420 mg/L.

Longwall mining is not anticipated beneath Cowboy Creek, however, SUFCO has committed in their MRP to implement a monitoring and mitigation plan for the creek if longwall mining beneath the creek is planned in the future. The monitoring and mitigation plan will be approved by the Division with concurrence by the Manti-La Sal Forest Service.

9) Box Canyon

The Box Canyon drainage encompasses 7,759 acres. The massive Castlegate Sandstone forms the consolidated rim of Box Canyon and Muddy Creek Canyon. The Blackhawk Formation is exposed in the bottom of the canyon below the boundary of the Quitichupah Lease. The surface rock forms near level outcrops that rim the area around to steep gorges of Box Canyon and Muddy Creek Canyon.

Using ground-water chemistry analysis, the recharge to the springs is believed to result primarily from flows in the Castlegate Sandstone as compared to the overlying Price River Formation. This appears to indicate that recharge to the springs in the Box Canyon tributaries is derived primarily from the area within 1,000 feet of the canyon rims (FEIS, 1999, and Mayo and Associates, 1999).

The headwaters of the Main (west) Fork of Box Canyon are located in the Quitichupah Tract and the headwaters of the East Fork are located in the Pines Tract. Several springs are located in the forks of Box Canyon. More springs are located in the Main Fork of Box Canyon, which eventually flows into Muddy Creek. Most of the lower sections of Box Canyon Creek are

perennial, but involve low baseflow volumes. The term "perennial functioning" has been used by the U.S. Forest Service to describe the upper reaches of the East Fork of Box Canyon where it is considered intermittent flow based on baseline monitoring of the PHC determination (Appendix 7-18 of the SUFCO MRP) and ongoing SUFCO water monitoring.

The perennial flows in the West and East Forks of Box Canyon as well as the main channel are allocated. Although the flows are generally low during the summer months, wildlife and cattle use the riparian and water resources. Using ground-water chemistry analysis, the recharge to the springs is believed to result primarily from flows in the Castlegate Sandstone as compared to the overlying Price River Formation. This appears to indicate that recharge to the springs in the Box Canyon tributaries is derived primarily from the area within 1,000 feet of the canyon rims (FEIS, 1999, and Mayo and Associates, 1999).

Water rights have also been issued on Muddy Creek, a receiving stream of Box Canyon. Vegetation communities are mapped on Plate 3-1 of the MRP. This map shows riparian communities along both forks of Box Canyon Creek and next to Muddy Creek. There are important riparian communities along both forks of Box Canyon Creek and next to Muddy Creek. In the West Fork of Box Canyon, seeps support some hanging garden communities of ferns, including one sensitive species, the Link Canyon Columbine. Muddy Creek and the lower portion of Box Canyon Creek support fish populations.

Longwall mining has been conducted in the Pines Tract Lease beneath portions of the East and West Forks of Box Canyon. Overburden above the stream channels ranges between 400 feet to a little over 900 feet. Areas where overburden is less than 400 feet were not mined by the permittee. The USDA Forest Service (USFS) initially stipulated in the Record of Decision (ROD) that areas under perennial streams would not be mined. However, due to constraints caused by a sandstone channel encountered during mining in the Pines Tract, SUFCO requested a permit to undermine perennial portions of the East Fork of Box Canyon. The permit was issued with concurrence of the Manti-La Sal Forest Service under the condition of implementing a monitoring and mitigation plan. The plan consists of baseline and ongoing vegetation, subsidence, and water monitoring to determine if damage occurs to the stream channel due to mining. Mitigation consists of repair of the stream channel and/or riparian vegetation if it is determined that damage has occurred. The plan is found in Appendix 3-10 of the SUFCO MRP and is discussed in sections below in this CHIA.

10) Wileys Fork Canyon

Wileys Fork Canyon is an ephemeral drainage encompassing 1,625 acres located east of the Pines Tract. Although part of the CIA, it has not been evaluated for hydrologic parameters. Proposed coal mining in the Pines Tract show the mine layout to end approximately ½ to one mile from the canyon. The mine workings are down-dip from the canyon. Hydrologic impacts to the canyon are unlikely.

11) Wash Rock Canyon

Wash Rock Canyon is an ephemeral drainage encompassing 1,390 acres and lies west and south of Wileys Canyon. It is also included in the CIA for future mining. Similar conditions exist as with Wileys Canyon, except the canyon is one to two miles away. No hydrologic impacts are expected to take place in the canyon because the SUFCO Mine projections do not extend into the canyons.

STREAM MONITORING

Stream monitoring sites are identified on Plate 4 and all surface monitoring sites are listed in Table 7. Monitoring also includes three UPDES sites and stock pond sites. Two UPDES sites, 001 and 002, are located in East Spring Canyon and a third, 003A, is located in the North Fork of Quitichupah Creek.

The following streams within the SUFCO permit area are considered perennial:

North Fork of Quitichupah Creek as measured at SUFCO-007 and SUFCO-042;
South Fork of the North Fork of Quitichupah Creek as measured at SUFCO-006;
Quitichupah Creek as measured at SUFCO-041 and SUFCO 046;
Box Canyon as measured at stations SUFCO-090, Pines 403, and Pines 407;
East Fork of Box Canyon as measured between stations Pines 106 and 408;
Cowboy Creek as measured at station M-STR4; and
Muddy Creek as measured at stations Pines 405 and Pines 408.

Link Canyon is considered intermittent because it is often dry except for about 100 feet that is fed by the monitored springs GW-21 and Pines 100 located at the head of the canyon.

Surface monitoring sites are sampled three times per year. Data is submitted to the Division's electronic database by the end of the quarter following the sampling. Surface-water monitoring will continue through the operational and reclamation phases until bond release.

Sites identified as FP-1 and FP-2 will be monitored on or near October 1 each year to determine the extent of perennial stream flow in the upper reaches of Box Canyon. Site 047 is now monitored as a surface monitoring site. Monitoring sites 407 and 408 will be monitored in

gallons per minute during June through October for a five year period to identify any mining effect to the streams in the east and west forks of Box Canyon.

Several stock water monitoring ponds are located in the permit area (Plate 5). Surface cracking due to mining induced subsidence has affected a few of the ponds on the Quitichupah and Pines Tracts. SUFCO has tried to mitigate the fracturing by applying bentonite into the cracks and hauling water to livestock. SUFCO is currently negotiating with the Manti La Sal Forest Service to create a workable mitigation plan. SUFCO has committed to visiting the ponds to photograph them to establish any evidence of cracking, marking their depth, and noting general soil moisture conditions and pond condition. More information is provided in sections below.

SUFCO has established a monitoring plan to collect water quality data of surface waters. The monitoring plan meets the requirements of the state and federal regulations, and guidelines established by the Division. Flow monitoring data for the stream monitoring sites is presented in Table 7.

Table 7
Stream Monitoring Locations
SUFCO Surface-Water Monitoring Program
 (see Plate 4)

	LOCATION								NOTES and COMMENTS
SUFCO IDENTIFICATION		Elevation	UTM Coordinates		Flows in GPM			Monitoring Period	1 - SUFCO Mine monitoring data; 2 - Mayo and Associates 1993, 1995, and 1996 sampling reported in Mayo and Associates, 1997a 3 - SUFCO MRP 4 - UDOGM Database 5 – Petersen Hydrologic, 2005
			X - Coordinate	Y - Coordinate	Maximum	Minimum	Number of samples		
006	South Fork Quitchupah	8560	463680	4312890	933.5	0.31	43	6/21/83 - present	1, 2, 3
007	North Fork Quitchupah	8240	464750	4315090	5772	44.9	43	6/21/83 - present	1, 2, 3
041	Lower Quitchupah	6400	469100	4305400	3,110	0.2	52	4/20/83 - present	1, 2, 3
042	Lower Quitchupah	6350	469160	4305420	9,371	1.6	52	4/20/83 - present	1, 2, 3
046	Middle Quitchupah above	7240	463820	4306430	358	0.0	46	6/22/83 - present	1, 2, 3
047A	Lower East Spring Canyon	7160	464030	4306450	4,488	0.1	40	10/5/79 - present	3, 4
090	Box Canyon Creek at lease	8320	469470	4316820	62.8	0.0	28	7/27/89 - present	1, 2, 3
106	Upper East Fork Box Canyon	8200	471550	4316990	4.0	0.1	14	8/23/2000 - present	3, 4
302	Muddy Creek-Last Water Creek	7140	472140	4319900	33.7	0.0	15	1/6/2000 - present	3, 4
403	Lower Box Canyon	7270	471500	4320000	248	26.6	15	1/6/2000 - present	3, 4
405	Muddy Creek-Box Canyon	7260	471480	4320110	7,854	14.1	15	8/21/2000 - present	3, 4
406	Lower Muddy Creek	6870	474500	4318210	68,666	76	15	1/6/2000 - present	3, 4
407	Box Canyon Creek	7685	470430	4318320	162	38.4	15	1/6/2000 - present	3, 4
408	East Fork of Box Canyon Creek	7685	470530	4318330	38.4	0.1	15	1/6/2000 - present	3, 4
USFS 109	Upper Main Fork of Box Canyon	8280	469680	4315590	0.2	0.0	16	8/12/1999 - present	3, 4

Table 7
Stream Monitoring Locations
SUFCO Surface-Water Monitoring Program
(see Plate 4)

	LOCATION								NOTES and COMMENTS
SUFCO IDENTIFICATION		Elevation	UTM Coordinates		Flows in GPM			Monitoring Period	1 - SUFCO Mine monitoring data; 2 - Mayo and Associates 1993, 1995, and 1996 sampling reported in Mayo and Associates, 1997a 3 - SUFCO MRP 4 - UDOGM Database 5 – Petersen Hydrologic, 2005
			X - Coordinate	Y - Coordinate	Maximum	Minimum	Number of samples		
FP-1	East Fork of the Main Fork of Box Canyon Creek	8260 to 8360	470010	4315570	0.3	0.0	4	10/6/2000 - present	3, 4
FP-2	East Fork of the East Fork of Box Canyon Creek	8200 to 8260	471810	4316910	2	0.0	4	10/6/2000 - present	3, 4
M-STR4	Cowboy Creek	8164	NA	NA	717	0.0	20	2001 - present	3, 4, 5

IV. IDENTIFY HYDROLOGIC CONCERNS

General hydrologic concerns include changes of flow rates and chemical composition that could physically affect the off-permit hydrologic balance. Changes to the existing hydrologic regime or balance need to be limited in order to prevent economic loss to existing agricultural and livestock enterprises, prevent significant alteration to the channel size or gradient, and maintain adequate capacity for existing fish and wildlife communities. The basis for the limiting value of a parameter may differ according to specific site conditions.

SUBSIDENCE

Subsidence impacts are largely related to extension and expansion of existing fracture systems and upward propagation of new fractures. Inasmuch as vertical and lateral migration of water appears to be partially controlled by fracture conduits, readjustment or realignment in the conduit system will inevitably produce changes in the configuration of ground-water flow. Potential changes include increased flow rates along fractures that have "opened", and diverting flow along new fractures or within permeable lithologies. Increased flow rates along fractures would reduce ground-water residence time and potentially improve water quality. Subsurface flow diversion may cause the depletion of water in certain localized aquifers and potential loss of flow to springs that will be undermined.

Mining at the SUFCO Mine has been by both room-and-pillar and longwall methods, and both will be used in future mining. Surface cracks are common above the mine, especially in shallow overburden areas. Subsidence is likely only over longwall panels, over room-and-pillar areas where second mining is done, and in surrounding areas within the expected angle-of-draw. The Castlegate Sandstone is a massive, rigid, and brittle sandstone unit that crops out over large portions of the permit area. The fracture pattern, described in the geologic section, is accentuated in the rock outcrop. When subsidence occurs, compressive and tensile stresses are relieved by movement along the fractures. Mine panel alignment and surface topography play a significant role in the amount and type of fracturing and/or movement that takes place. If fracturing extends deep or over a long distance, then surface and ground water can be diverted away from its original flow path, which could result in desiccation of springs, streams, ponds, and vegetation.

The predicted angle-of-draw is 15 degrees for the SUFCO Mine, which is based largely on the experience of past mining at SUFCO and other coalmine operators in the Wasatch Plateau.

East Fork of Box Canyon

Affects from undermining the stream channel were observed shortly after mining. Approximately 60 percent of the surface flow was lost during the summer of 2004 from the mining of the 3LPE panel. Subsidence caused extension fractures and buckling due to compression within sandstone layers that allowed the stream to flow subsurface for distances up to 200 feet before reappearing on top of a shaley outcrop exposed within the bottom of the stream channel. Some platy surface fracturing of sandstone bedrock was observed within the stream channel approximately 200 feet outside of the 15-degree angle-of-draw. Subsidence-induced fractured has caused a lowering of the water table causing several monitored springs located in the canyon above the stream to no longer discharge. Most of the subsidence damage was located within the Blackhawk Formation above the 3LPE panel. Subsidence-related damage above the 4LPE panel was less extensive within the Castlegate sandstone. Repairs made to surface fractures within the stream channel using hand tools and bentonite pellets have been successful so far. Loose rock was pushed aside and bentonite was used to seal fractures and channelize the stream.

Because of concerns of the effects of subsidence from longwall mining beneath the East Fork of Box Canyon causing a relocation of water resources, SUFCO is presently in the process of drafting a mitigation plan to compensate for the water loss at North Water Spring (Pines 105) and Pines 310 and Pines 311. The plan will likely involved diverting water from a spring located mid-way down the slope between the intersection of Box Canyon and the East Fork of Box Canyon. Currently the U.S. Forest Service owns the water rights on the springs in the Pines Area. The mitigation plan is pending the approval of the Forest Service and is anticipated to be reviewed by the Forest Service in 2011. In addition, the pre-mining conditions of the East Fork of Box Canyon were documented on video, which is available for the public in the Division Public Information Center (PIC). The SUFCO Mine has been diligent at following their monitoring plan to date and have applied reasonable and effective mitigation efforts when needed. The North Water Spring mitigation area has been designated as a disturbed area within the lease boundary (refer to Plate 4 – Hydrology Map).

Cowboy Creek

Longwall mining is not anticipated beneath Cowboy Creek for the SITLA Muddy Tract mining projections, however, SUFCO has committed in their MRP to implement a monitoring and mitigation plan for the creek if longwall mining beneath the creek is planned in the future. The monitoring and mitigation plan will be approved by the Division with concurrence by the Manti-La Sal Forest Service.

Stockwatering Ponds

The Forest Service and cattlemen use and maintain several stock watering ponds located on Forest Service Land within the undisturbed area of the SUFCO permit area. The water rights to the stock watering ponds are owned by the Forest Service and used by cattlemen with leases to run cattle on the Forest Service land. Claims have been made by the Forest Service and cattlemen that surface cracking due to mining related subsidence within the Quitcupah and Pines Tracts has had impacts on some of the ponds. The Division investigated this issue in 2004 and 2005. Because no baseline data was collected on the ponds in previous years, and because drought conditions have existed from 1999 through 2004, it was not clear to the Division that the ponds had been adversely impacted. In order to mitigate the potential damage to the ponds, SUFCO has taken action by monitoring pond conditions, applying bentonitic clay seals to the pond floors, and hauling water in for livestock. SUFCO is also working with the Forest Service to install guzzlers for wildlife and developing a plan to establish a water system between ponds for cattle. The Division is keeping track of the negotiations between SUFCO, the Forest Service, and cattlemen to make sure that the potentially affected parties are satisfied. If the Forest Service and cattlemen are not satisfied with the situation and make a formal complaint to the Division, then the Division will make a finding at that time. The Forest Service was consulted by the Division and did not request that baseline data be collected for ponds within the SITLA Muddy Tract.

GROUNDWATER

The greatest mining-related potential for impacting ground-water resources in the CIA comes from dewatering and subsidence. Following spring and seep surveys and baseline studies prior to mine permitting, representative springs and seeps are chosen for a mine's monitoring plan to aid in the determination of mining-related impacts to the hydrologic balance and water rights.

Twenty-three springs and seeps are being monitored within and adjacent to the SUFCO Mine permit area. With the exception of several springs within the East Fork of Box Canyon, monitoring of springs for the SUFCO Mine has not identified any mining-related impacts and future diversion of spring flow is considered to be an overall low risk.

Water users have expressed concerns that water intercepted underground may be discharged into a watershed other than the one where the ground water was originally destined. In particular, the water users are concerned that water discharged by the mine into the North Fork of Quitcupah Creek originated from perched aquifers in the Pines Tract within the Muddy Creek watershed. According to the Utah Coal Mining and Reclamation Act and rules, a mine may divert water underground and discharge to the surface if material damage to the hydrologic balance outside of a permit area is prevented and disturbance to the hydrologic balance within the permit area is minimized (R645-301-731.214.1). Furthermore, any state-appropriated water

affected by contamination, diminution, or interruption resulting from underground mining must be replaced (R645-301-731.530). The Division evaluates a mine's Probable Hydrologic Consequences Determination (PHC) and updates the CHIA prior to permitting, and reviews water monitoring data during mining and following reclamation to determine if adverse hydrologic impacts, as defined by the rules, can be demonstrated. Underground mining may result in some diversions of intercepted ground water into drainages that are not topographically within (above) the area where the water was encountered. The SUFCO PHC has demonstrated that water that is projected to be intercepted is mostly ancient and therefore hydrologically isolated from springs, seeps, and streams. If it is subsequently demonstrated that the mining has caused or will cause a diminution, contamination, or interruption of an appropriated water right or a material impact to the hydrologic balance either within or outside of the permit area, the permittee will be required by the Division to address means of minimizing the impact and replacing any appropriated water rights.

It is not known how much water will be generated from the mine workings once mining stops. The current mine plan shows that the mine will be sealed. Ground water should back up behind the seals and fill the voids remaining from the collapsed mine.

Aquifer Dewatering

Using isotopic analysis, Mayo and Associates (1999) have identified that the waters from the mine workings are older than waters from springs located in the Castlegate Sandstone. They concluded that water in the Blackhawk Formation is disconnected from that of the Castlegate Sandstone. Considering the amount of shales, siltstones, and mudstones and their information from isotopic analysis, their conclusions have substantial basis. However, substantial fracturing is taking place because of subsidence, with subsidence generally up to 5 or 6 feet. Rock fracturing can propagate long distances horizontally and laterally, affecting aquifers and surface-water sources. Only future monitoring can provide the information to assess changes in the hydrologic balance and impacts off the permit area.

SURFACE WATER

Increased discharge, especially runoff from disturbed areas, could alter flow volumes, water quality, and runoff and flood patterns in creeks. Mining in the SUFCO lease area is not expected to increase discharge of surface or ground water beyond current levels. Creeks and drainage areas discussed are shown on Plate 4, Hydrology Map.

Subsidence could affect the character of drainages by altering the natural slope of the channel. However, large-scale impacts are unlikely because of the thick overburden (typically projected to be from 600 to 2,000 feet thick) between the mine operations and the surface drainages. With the exception of the East Fork of Box Canyon, full extraction mining is not

planned under any perennial reaches of streams within the CIA.

The potential for cracks to divert water underground is limited by the self-healing characteristics of the formations, which consist of interbedded claystone, siltstone, and sandstone that are rich in montmorillonite clays. Fractures at the surface are prone to heal rapidly because of the expanding nature of these clays. Material from the Blackhawk Formation was examined by X-ray diffraction and found to contain up to 58 percent montmorillonite clays (Crandall Canyon Mine MRP, App. 7-41). These clays absorb water and their volume can expand as much as 50 percent even when they are associated with other soil and rock materials.

Twenty-three stream sites are being monitored within and adjacent to the SUFCO Mine permit area. With the exception of a temporary decrease of flow and increase of TDS concentrations for the East Fork of Box Canyon Creek, monitoring of streams for the SUFCO Mine has not identified any mining-related impacts and future diversion of stream flow is considered to be an overall low risk.

V. IDENTIFY RELEVANT STANDARDS

RELEVANT STANDARDS

The CHIA is based on the best currently available data and is a prediction of mining related impacts to the hydrologic balance outside of the specific permitted coal mine areas. To verify that conditions remain within acceptable limits, the mine operator is required to monitor water quality and quantity as part of the permit requirements. The plans for monitoring are set forth in the Mining and Reclamation Plans (MRP) for the SUFCO Mine and have been determined adequate by the Division to meet regulatory requirements. If monitoring results show significant departures from the values established in the MRP and in this CHIA, or exceed UPDES discharge requirements, immediate remedial actions are provided for by SMCRA.

Water quality standards for surface waters in the State of Utah are found in R317-2, Utah Administrative Code (UAC). The standards are intended to protect the waters against controllable pollution. Waters, and the applicable standards, are grouped into classes based on beneficial use designations. The Utah Division of Water Quality of the Department of Environmental Quality has classified surface waters in the CIA as:

- M 2B - protected for recreational uses except swimming,
- M 3C - protected for nongame fish and aquatic life, and
- M 4 - protected for agricultural uses.

Flow: There is no standard for flow neither in either the SUFCO Mine permit nor in Utah water quality standards. At the SUFCO mine, UPDES discharge is to be recorded twice monthly. It is not expected that the SUFCO Mine UPDES permit will have a flow limitation. Characteristics such as stream morphology, vertebrate and invertebrate populations, and water chemistry can be affected by changes in flow and therefore can provide an indirect standard for flow.

Oil and Grease: There is no State water quality standard for oil and grease, but the UPDES permit limit for the SUFCO Mine is a daily maximum of 10 mg/L; only one sample a month, either grab or composite, is required to measure this, but weekly visual monitoring is required. A 10 mg/L oil and grease limit does not protect fish and benthic organisms from soluble oils such as those used in longwall hydraulic systems, and UDWR has recommended soluble oils be limited to 1 mg/L (Darrell H. Nish, Acting Director UDWR, letter dated April 17, 1989 to Dianne R. Nielsen, Director UDOGM).

Total Dissolved Solids (TDS) concentrations: The concentration of dissolved solids is commonly used to indicate general water quality with respect to inorganic constituents.

There is no state water quality standard for TDS for Classes 1, 2, and 3, but 1,200 mg/l is the limit for agricultural use (Class 4). The SUFCO Mine UPDES permit limits instantaneous TDS concentration to 1,200 mg/L, determined by two grab samples a month. The total amount of dissolved solids discharged from all SUFCO Mine operations is limited to 5 tons per day, determined by the twice monthly measurements of flow and TDS.

pH: Allowable pH ranges are 6.5 to 9.0 under the SUFCO Mine UPDES permit and State water quality standards for all Classes.

Total Suspended Solids (TSS) and Settleable Solids: There is no State water quality standard for suspended solids in the water, but an increase in turbidity is limited to 10 NTU for Class 2A, 2B, 3A, and 3B waters and to 15 NTU for Class 3C and 3D waters. The SUFCO Mine UPDES permit allows a daily maximum of 70 mg/L TSS, but limits the 30-day average to 25 mg/L: two grab samples a month are used to determine TSS. Under the SUFCO Mine UPDES permit, all samples collected during storm water discharge events are to be analyzed for settleable solids. Samples collected from increased discharge, overflow, or bypass that is the result of precipitation that does not exceed the 10-year, 24-hour precipitation event can comply with a settleable solids standard of 0.5 mL/L daily maximum rather than the TSS standard, although TSS is still to be determined. If the increased discharge, overflow, or bypass is the result of precipitation that exceeds the 10-year, 24-hour precipitation event, then neither the TSS nor settleable solids standard applies.

Iron and Manganese: The SUFCO Mine UPDES permit allows a daily maximum of 1.0 mg/L total iron, which is based on an assumption that total and dissolved iron concentrations are the same. Grab samples are taken twice a month from the UPDES sites to determine iron concentration. With approval from the Division of Water Quality, up to 2 mg/L total iron can be discharged under certain circumstances, which include maintaining dissolved iron at or below 1 mg/L. State water quality standards allow a maximum of 1,000 µg/L dissolved iron in Class 3A, 3B, 3C, and 3D waters, with no standard for Class 1, 2, and 4 waters.

Monitoring of total manganese is required by SMCRA and the Utah Coal Mining rules, but there is no UPDES or water quality standard for either total or dissolved manganese.

Macroinvertebrates: Macroinvertebrates are excellent indicators of stream quality and can be used to evaluate suitability of a stream to support fish and other aquatic life. Baseline studies of invertebrates provide standards against which actual conditions in Box Canyon and Muddy Creeks can be evaluated if desired. Price and Plantz (1987) summarized invertebrate data. There are no current plans to monitor invertebrate populations in the streams of the CIA.

Utah water quality standards exist for numerous parameters other than those already mentioned above, but at this time there is no evidence or reason indicating they are of concern or have a reasonable potential to affect the hydrologic balance of the CIA. However, those parameters that may have a reasonable possibility of affecting the hydrologic systems are included in routine water quality monitoring of the mine operations. Review of monitoring results by the mine operators and the Division will identify concerns or problems and generate revisions of the mine operations to mitigate those problems.

Sediment is a common constituent of ephemeral stream flow in the western United States. The quantity of sediment in the flows affects stream-channel stability and most uses of the water. Excessive sediment deposition is detrimental to existing aquatic and wildlife communities. Large concentrations of sediment in streamflow may preclude use of the water for irrigating crops because fine sediment tends to reduce infiltration rates in the irrigated fields, and the sediment reduces capacities of storage facilities and damages pumping equipment. Mean sediment load is the indicator parameter for evaluating the sediment hazard to stream-channel stability and irrigation.

The concentration of dissolved solids is commonly used to indicate general water quality with respect to inorganic constituents. The quality of water from underground sources reflects the chemical composition of the rocks it passes through. That quality may be degraded by intrusion of poorer quality water from wells or mines, by leakage from adjoining formations, or by recharge through disturbed materials. Ground water discharging from seeps and springs is used by wildlife and livestock. The state standard for TDS for irrigation of crops and stock watering (Class 4) is 1,200 mg/L.

The Utah Department of Environmental Quality, Division of Water Quality can authorize a coal mine to discharge into surface waters under the Utah Pollutant Discharge Elimination System (UPDES). At the time this CHIA was prepared, the SUFCO Mine had applied for three UPDES permits, one to discharge from the planned sediment pond, a second to discharge from the treatment facility to East Spring Hollow, and a third to discharge from the mine to North Fork of Quitichupah Creek.

The SUFCO Mine UPDES permit contains site-specific limitations on TDS, total suspended solids, total settleable solids (for discharges resulting from precipitation events), total iron, oil and grease, and pH. There is no limit on flow but it is to be measured monthly. Additionally, there can be no more than a trace amount of visible sheen, floating solids, or foam and no discharge of sanitary waste or coal process water.

Macroinvertebrates are excellent indicators of stream quality and can be used to evaluate suitability of a stream to support fish and other aquatic life.

MATERIAL DAMAGE

Material damage to the hydrologic balance would possibly manifest itself as an economic loss to the current and potential water users, would result in quantified reduction of the capability of an area to support fish and wildlife communities, or would cause other adverse change to the hydrologic balance outside the permit area. The basis for determining material damage may be found to differ from site-to-site within the CIA according to specific site conditions. Surface-water and ground-water concerns have been identified for CHIA evaluation.

Parameters for surface-water quantity and quality

The potential material-damage concerns this CHIA focuses on are changes of surface flow rates and chemical composition that would physically affect the off-permit stream channel systems as they presently function and affect aquatic and wildlife communities and agricultural and livestock production. Therefore, criteria are intended to identify changes in the present discharge regime that might be indicators of economic loss to existing agricultural and livestock enterprises; of significant alteration to the channel size, or gradient; and of a loss of capacity to support existing fish and wildlife communities. In order to assess the potential for material-damage to these elements of the hydrologic system, the following indicator parameters were selected for evaluation at each evaluation site: low-flow discharge rate, TDS, and sediment load.

Low-Flow Discharge Rate

Measurements provided by mine operators are generally of instantaneous flow and provide some indication of long-term trends. In the Wasatch Plateau Waddell and others (1981) found that correlating three years of low-flow records (September) at stream sites against corresponding records from long-term monitoring sites would allow the development of a relationship that could be used to estimate future low-flow volumes at the stream sites within a standard deviation of approximately 20 %. Ten years of record reduced the standard deviation to 16 % to 17 %, and 15 years of data to about 15 %.

Monitoring of low-flow discharge rates will also provide a means to evaluate effects of mine discharge on the receiving streams. SUFCO Mine discharge will be monitored at UPDES discharge points at the sediment pond and the direct discharge from the mine. The potential for material damage by mine discharge water is tied to the effect on the flow in the receiving streams.

Total Dissolved Solids (TDS)

The concentration of dissolved solids is commonly used to indicate general water quality with respect to inorganic constituents. Ground water discharging from seeps and springs is used by wildlife and livestock. Because wildlife and livestock use is the designated post-mining land

use, established dissolved solids tolerance levels for wildlife and livestock have been adopted as the thresholds beyond which material damage may occur. The state standard for TDS for irrigation of crops and stock watering (Class 4) is 1,200 mg/L. If TDS concentrations persistently exceed 1,200 mg/L it will be an indication that evaluation for material damage might be needed. It must be kept in mind that there have been single samples from outfalls UPDES 003A (North Fork of Quitcupah Creek) and UPDES 001 (East Fork of Quitcupah Creek) in which TDS has exceeded this 1,200 mg/L threshold.

Sediment Load

Sediment is a common constituent of ephemeral stream flow in the western United States. The quantity of sediment in the flows affects stream-channel stability and most uses of the water. Excessive sediment deposition is detrimental to existing aquatic and wildlife communities. Large concentrations of sediment in streamflow may preclude use of the water for irrigating crops because fine sediment tends to reduce infiltration rates in the irrigated fields, and the sediment reduces capacities of storage facilities and damages pumping equipment. Sediment load measurement error is, at a minimum, the same as the flow measurement error because sediment load is directly dependent on flow and in practice cannot be measured more accurately than the flow.

TSS is the indicator parameter initially chosen for evaluating the sediment hazard to stream-channel stability and irrigation. Threshold values have initially been set as the greater of 1 standard error above the baseline mean TSS value or 120 % of the baseline mean TSS value (by analogy with the low-flow discharge rate measurement accuracy and assuming that the error in TSS will contribute equally to the error in flow when determining mean sediment load). If TSS concentrations persistently exceed these threshold values it will be an indication that evaluation for material damage from sediment load in the streams might be needed.

Parameters for ground-water quantity and quality

The potential material-damage concerning this CHIA are intended to limit changes in the quantity and chemical composition of water from ground-water sources to magnitudes that: will not cause economic loss to existing or potential agricultural and livestock enterprises and maintain the hydrologic balance.

Seasonal flow from springs

Maintain potentiometric heads that sustain average spring discharge rates, on a seasonal basis, equal or greater than 80 % of the mean seasonal baseline discharge, in other words baseline minus 20 % probable measurement error. The 20 % measurement error is based on analogy with the accuracy of measuring low-flow surface discharge rates. A 20 % decrease in flows, determined on a seasonal basis, will indicate that decreased flows are probably persisting and that an evaluation for material damage is needed.

TDS concentration

The concentration of total dissolved solids is commonly used to indicate general water quality with respect to inorganic constituents. The quality of water from underground sources reflects the chemical composition of the rocks it passes through. Ground-water quality may be degraded by intrusion of poorer quality water from wells or mines, by leakage from adjoining formations, or by recharge through disturbed materials. Ground water discharging from seeps and springs is used by wildlife and livestock, and those are the designated post-mining land uses. There is no water quality standard for TDS for aquatic wildlife. The state standard for TDS for irrigation of crops and stock watering (Class 4) is 1,200 mg/L. If TDS concentrations persistently exceed 1,200 mg/L it will be an indication that evaluation for material damage might be needed.

VI. ESTIMATE PROBABLE FUTURE IMPACTS OF MINING ACTIVITY

GROUNDWATER

Dewatering and subsidence related to mining have the greatest potential for impacting ground-water resources in the CIA.

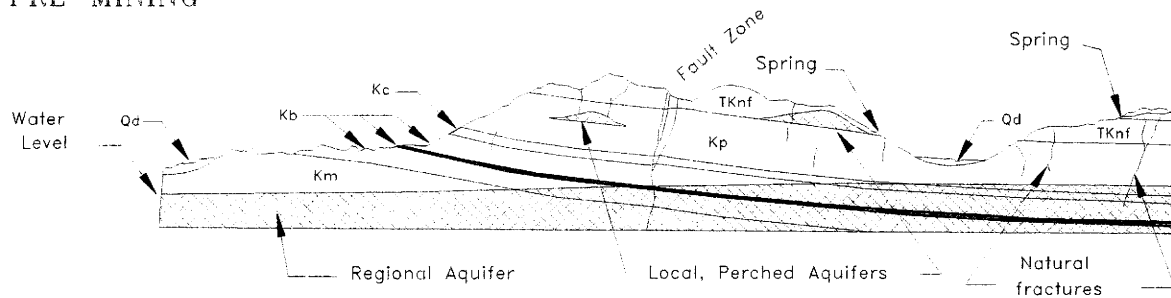
Dewatering

Underground mining removes the support to overlying rock causing caving and fracturing of the overburden. In most mining areas it is unlikely that fractures will reach shallower perched aquifers because of the thickness of the overburden, but in areas where fracturing is extensive, subsidence induced caving and fracturing can create conduits that allow ground water to flow into the mine. Dewatering caused by fracturing may decrease aquifer storage and ground-water flow to streams and springs (Figure 4). Water quality downstream from the mines could improve because water being discharged from coal mines in the Wasatch Plateau is often of better quality than natural spring flow or base flow.

Total ground-water storage above the Upper Hiawatha seam has not been calculated, however the rate of current discharge with respect to the area mined indicates an extensive storage capacity or that recharge is entering the mine from another area. The SUFCO Mine is currently discharging approximately 5 million gallons per day. An average inflow calculation would not justify the real hydrologic functions; however it could correlate the rate of discharge to area mined. The rate of discharge with coal production is shown on Table 4 and in Figure 3, which could provide a useable ratio, except panel orientation and size varies within the mine to yield discrepancies.

Ground-water dewatering verses ground-water recharge needs to be studied more if impacts to springs and streams are identified.

PRE--MINING



POST-MINING

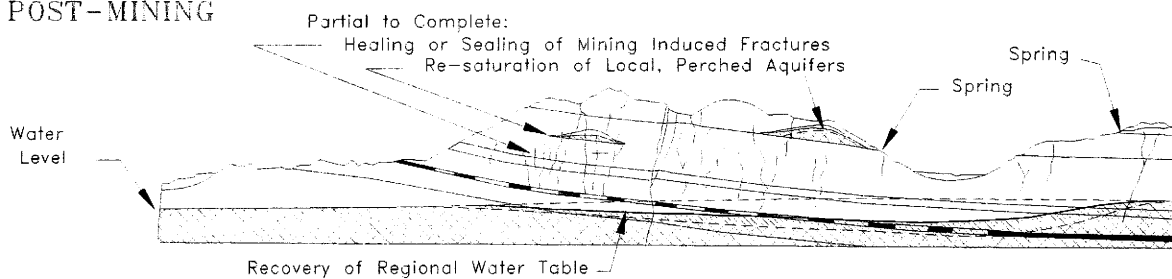


Figure 4 - Potential Long-term Effects of Coal Mining on Ground-water Resources

Subsidence

Subsidence impacts are largely related to extension and expansion of existing fracture systems and upward propagation of new fractures. Inasmuch as vertical and lateral migration of water appears to be partially controlled by fracture conduits, readjustment or realignment in the conduit system will inevitably produce changes in the configuration of ground-water flow. Potential changes include decreased flow through existing fractures that close, increased flow rates along existing fractures that open further, and the diverting of ground-water flow along new fractures or within newly accessible permeable lithologies. Subsurface flow diversion may cause the depletion of water in local aquifers and loss of flow to springs that are undermined. Increased flow rates along fractures could potentially improve water quality by reducing ground-water residence time.

Subsidence surveys have been conducted at SUFCO Mine on an annual basis since 1988 using ground surveying supplemented with photogrammetric methods if needed. Annual subsidence reports are provided to the Division. Annual reports for 1988 through 2005 indicate extensive subsidence over the current SUFCO Mine permit area. The relatively moderate thickness of the overburden and the fracture system are major contributors to the amount of subsidence.

Mining at the Pines and SITLA Muddy Tracts is currently planned for the upper Hiawatha coal seam only, and overburden thickness will generally be 1,000 feet. The potential for subsidence related surface impacts has been reviewed and estimated, but still needs to be studied to completely identify all aspects of the impacts.

SURFACE WATER

Changes in flow volume and in water quality have the greatest potential for impacting surface-water resources in the CIA. The monitoring plan should help identify variations in flow caused by mining. Monitoring is a benefit to both the public and the operator, because it can identify and separate natural and anthropogenic variations to the environment or ecosystem. A good monitoring plan can provide the necessary data to establish the necessary mitigation or show the variations are following a natural sequence.

Water Quality

The quality of the local surface waters can be affected by two basic processes. First, the runoff from the disturbed lands and waste piles could increase sediment concentrations and alter the distribution and concentration of dissolved solids in the receiving streams. This potential has been shown to be minimized. The second potential cause of surface-water quality changes is related to the location and chemistry of ground-water discharges, both from the mines and from springs and baseflow.

Water Quantity

Water not used in the SUFCO Mine or lost to evaporation is discharged to the North Fork of Quitichupah Creek through UPDES 003A. Discharge rates have increased over the life of the mine. Ongoing monitoring will indicate total ground-water discharge due to mining.

Upon termination of mining operations, discharge of ground water from the SUFCO Mine will be discontinued and the mine will begin to flood. There will be a reduction in flow in the North Fork of Quitichupah Creek because of the loss of the mine discharge. The time required for mine flooding will depend not only on the rate of water inflow but also on the amount of caving and the void space remaining after caving. Complete flooding of the mine may never occur because flow out of the mine through the roof, floor, and ribs and into the surrounding rock will increase as flooding increases the hydraulic head within the abandoned workings.

ALLUVIAL VALLEY FLOORS

A negative Alluvial Valley Floors (AVF) determination has been made based on the studies conducted by Canyon Fuels Company, LLC for the approved SUFCO MRP. These studies have not confirmed the existence of unconsolidated stream laid deposits holding streams and sufficient water to support agricultural activities within the mine plan area.

VII. ASSESS PROBABLE MATERIAL DAMAGE

The probable hydrologic impacts are summarized below under the headings entitled Next Five Year Permit Term and Future Mining.

FIVE YEAR PERMIT TERM - SUFCO MINE

Planned operational monitoring will document any measurable changes in the surface- and ground-water systems. Surface disturbances and UPDES permitted discharges are not expected to degrade surface- or ground-water quality. There is no AVF to be impacted. Sediment control measures should continue to effectively prevent diminution of water quality in the receiving drainages.

The rate of dewatering will likely increase, because more mine area is being exposed. Previous dewatering trends have continued to increase as new mining areas have developed. Overburden thickness is 700 to 900 feet, yet surface manifestations of subsidence are present. Subsurface propagation of fractures may produce changes in ground-water flow that could affect local aquifers and springs. Future monitoring will provide data applicable to documenting changes in the ground-water system.

Surface disturbance and the discharge of SUFCO Mine water have not significantly degraded water quality in East Spring Canyon. Sediment control measures such as those intended for use at the SUFCO Mine have served to reduce contaminants and stabilize water quality at acceptable discharge levels.

Mining in the Pines Tract is ongoing and mining will begin in the WLM beginning in 2011. There will be no new surface disturbance for mining in either tract. A monitoring and mitigation plan for longwall mining beneath the East Fork of Box Canyon Creek is ongoing. The SUFCO Mine has been diligent at following their monitoring plan to date and have applied reasonable and effective mitigation efforts when needed. No material damage within or outside of the permit area is believed to have occurred. Material damage in this case would take the form of significant loss of natural habitat (the current or reasonably foreseeable use of land). Stream channel repairs have returned surface flows and dry springs have likely diverted to other areas within the drainage. However, monitoring of the stream, springs, and vegetation for significant loss of natural habitat is still ongoing.

FUTURE MINING

Underground mining may result in some diversions of intercepted ground water into drainages that are not topographically within (above) the area where the water was encountered. If it is demonstrated that mining has caused or will cause a diminution, contamination, or

interruption of an appropriated water right or a material impact either within or outside of the permit area, the permittee will be required by the Division to address means of minimizing the impact and replacing any appropriated water rights. Evaluations of PHCs and the preparation of this CHIA do not indicate that there is any evidence that such impacts will result from the proposed mining in the Quitichupah/Muddy Creek CIA, and as a consequence, there is no reason to require operators to propose alternatives for disposing of the displaced water or other possible actions as part of the PAP.

Increased rates of dewatering may, in the future, result in depletion of ground-water storage. Depletion of storage may terminate certain spring flows and base flow recharge to streams. Upon cessation of mining, mine water discharge should cease, according to the current mine plan. Mine flooding will probably result in reestablishment of the preexisting ground-water systems that, most likely, provided base flow to the streams.

Drainage from future surface disturbance will be managed through appropriate sediment controls. Future SUFCO disturbed area discharges will be directed through treatment facilities.

At the termination of mining, downstream potential AVFs will experience decreased flow. The duration and extent of this impact cannot be accurately assessed at this time. However, flow rates may be partially to fully restored when the ground-water system is reestablished by flooding of the abandoned mines.

The operational designs for the SUFCO Mine are determined, based on the information submitted in the mine plans and referenced literature, to be consistent with preventing damage to the hydrologic balance outside the mine plan areas.

Subsidence damage to the Castlegate Sandstone has occurred in the Pines Tract during longwall mining activities in 2005/2006 causing springs that originate from the Castlegate Sandstone to dry up due to a lowering of the water table. The damage from subsidence appears to have taken effect in areas where the Castlegate Sandstone is either exposed at the surface, or only a thin veneer of overlying Price River Formation rests on the Castlegate Sandstone. In the area of the WLM, precautions have been taken to avoid areas where similar conditions exist. For example Broad Hollow Spring, a developed spring fed by groundwater originating in the Castlegate Sandstone. The Castlegate is exposed at the surface in this area with no significant overburden cover. As a result, SUFCO plans to alter their mining plan to avoid longwall mining beneath the area where Broad Hollow Spring is located.

VIII. STATEMENT OF FINDINGS

Based on the information presented in this CHIA, the Utah Division of Oil, Gas and Mining finds that the proposed coal mining and reclamation operations of the SUFCO Mine including the WLM Tract have been designed to prevent material damage to the hydrologic balance outside the permit areas. Because of ongoing monitoring and mitigation, no evidence of material damage from actual mining operations in the CIA has been found thus far. No other probability of material damage has been identified from existing and anticipated mining operations in the CIA.

The operator has been cooperative in conducting environmental evaluations and operations to lessen impacts to the hydrologic environments.

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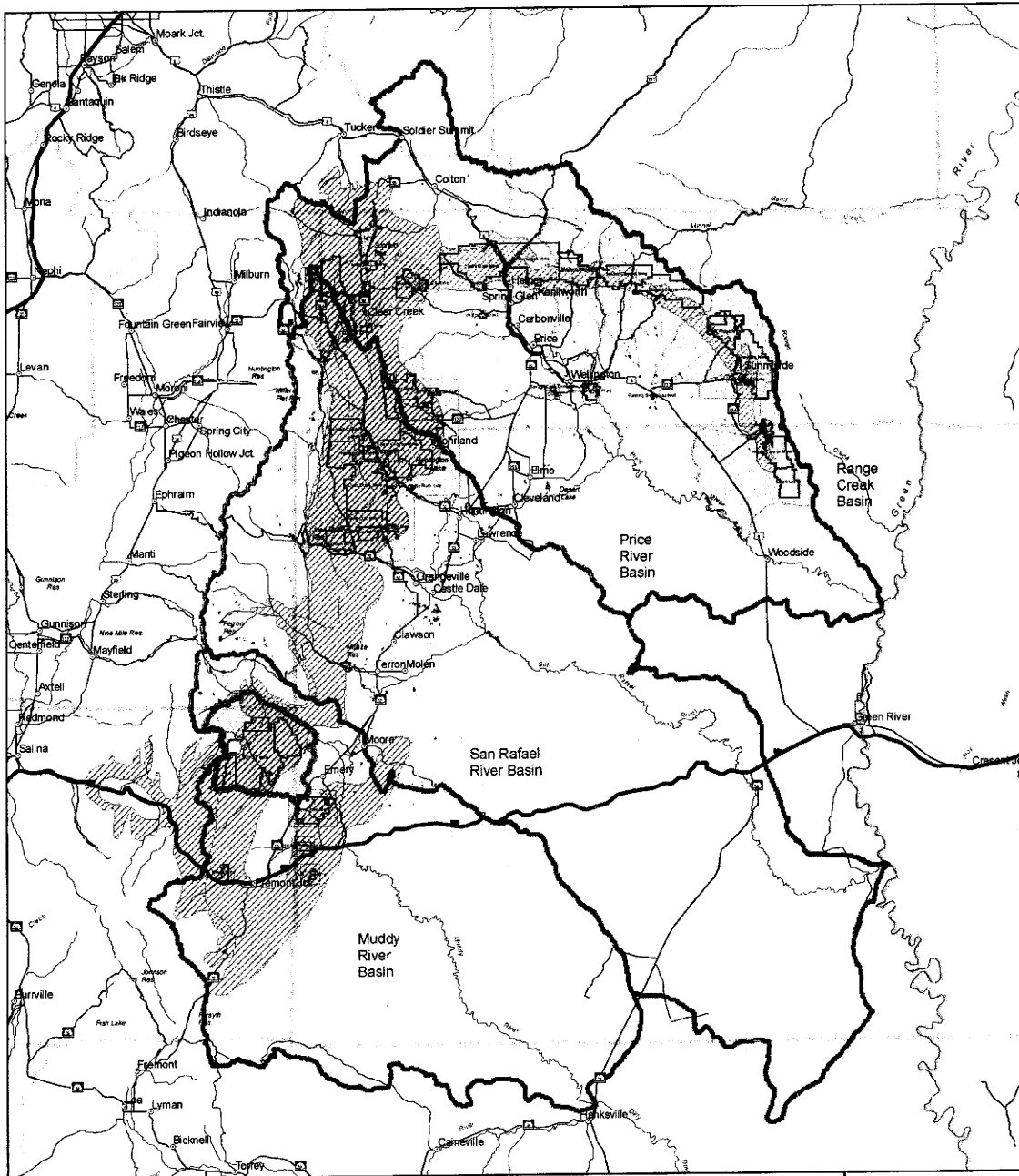
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ABBREVIATIONS

AVF	Alluvial Valley Floor
BLM	Bureau of Land Management
BTCA	Best Technology Currently Available
CIA	Cumulative Impact Area
CHIA	Cumulative Hydrologic Impact Area
DWQ	Utah Division of Water Quality
DWR	Utah Division of Wildlife Resources
FEIS	Final Environmental Impact Statement
mg/L	milligrams per liter
MRP	Mining and Reclamation Plan
MSHA	Mine Safety and Health Administration
NTU	Nephelometric Turbidity Units
PAP	Permit Application Package
PHC	Probable Hydrologic Consequences
PHDI	Palmer Hydrologic Drought Index
ROD	Record of Decision
SITLA	Utah School and Institutional Trust Lands Administration
SMCRA	Surface Mining Control and Reclamation Act of 1977
SUFCO	Southern Utah Fuel Company
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UDOGM	Utah Division of Oil, Gas and Mining
UDWR	Utah Division of Water Resources
UDWQ	Utah Division of Water Quality
UPDES	Utah Pollution Discharge Elimination System
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WRDS	Waste Rock Disposal Site



Cumulative Impact Area Quitichupah - Muddy Creek

Plate 1

Location Map

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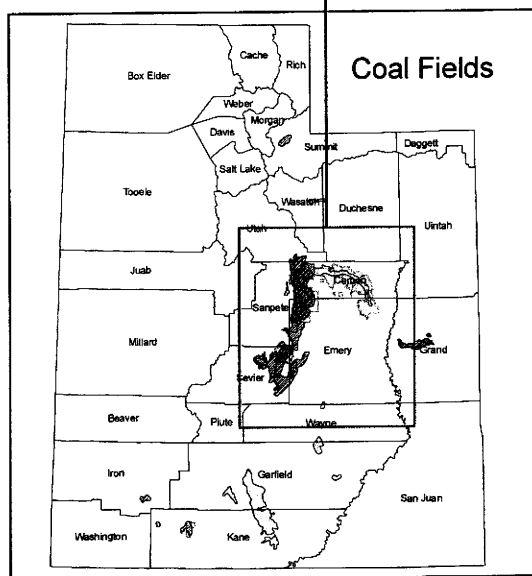
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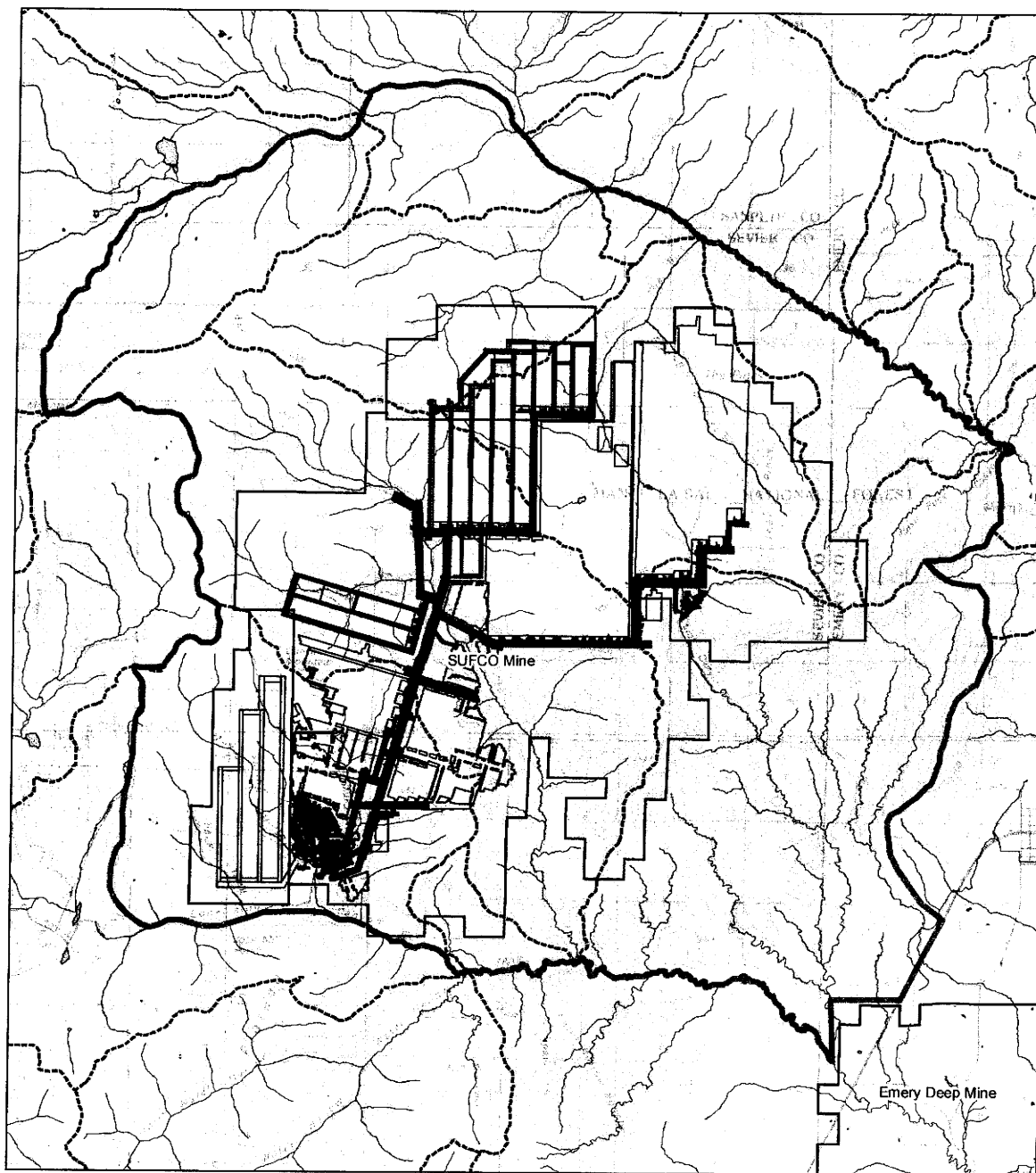
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|------------------------|---------------------------|
| Prop. Permit Extension | Intermittent stream |
| Lease Area | Stream or braided stream |
| CIA Areas | Major River Basin |
| Coalbeds | Water Bodies |
| Book Cliffs | Quitichupah - Muddy Creek |
| Wasatch Plateau | County Boundary |



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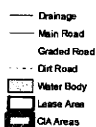
Cumulative Impact Area Quitchupah - Muddy Creek

Plate 2

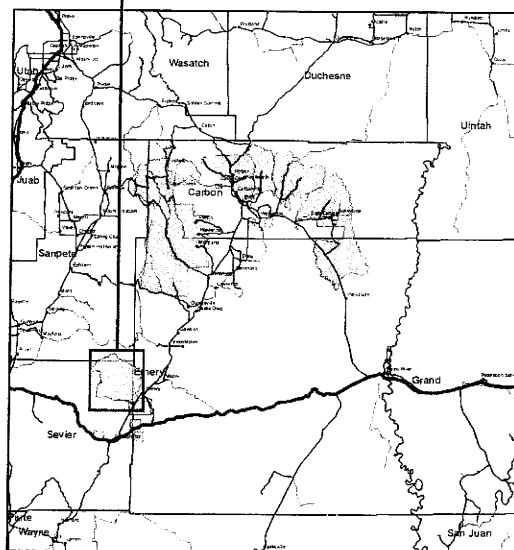
Workings Map

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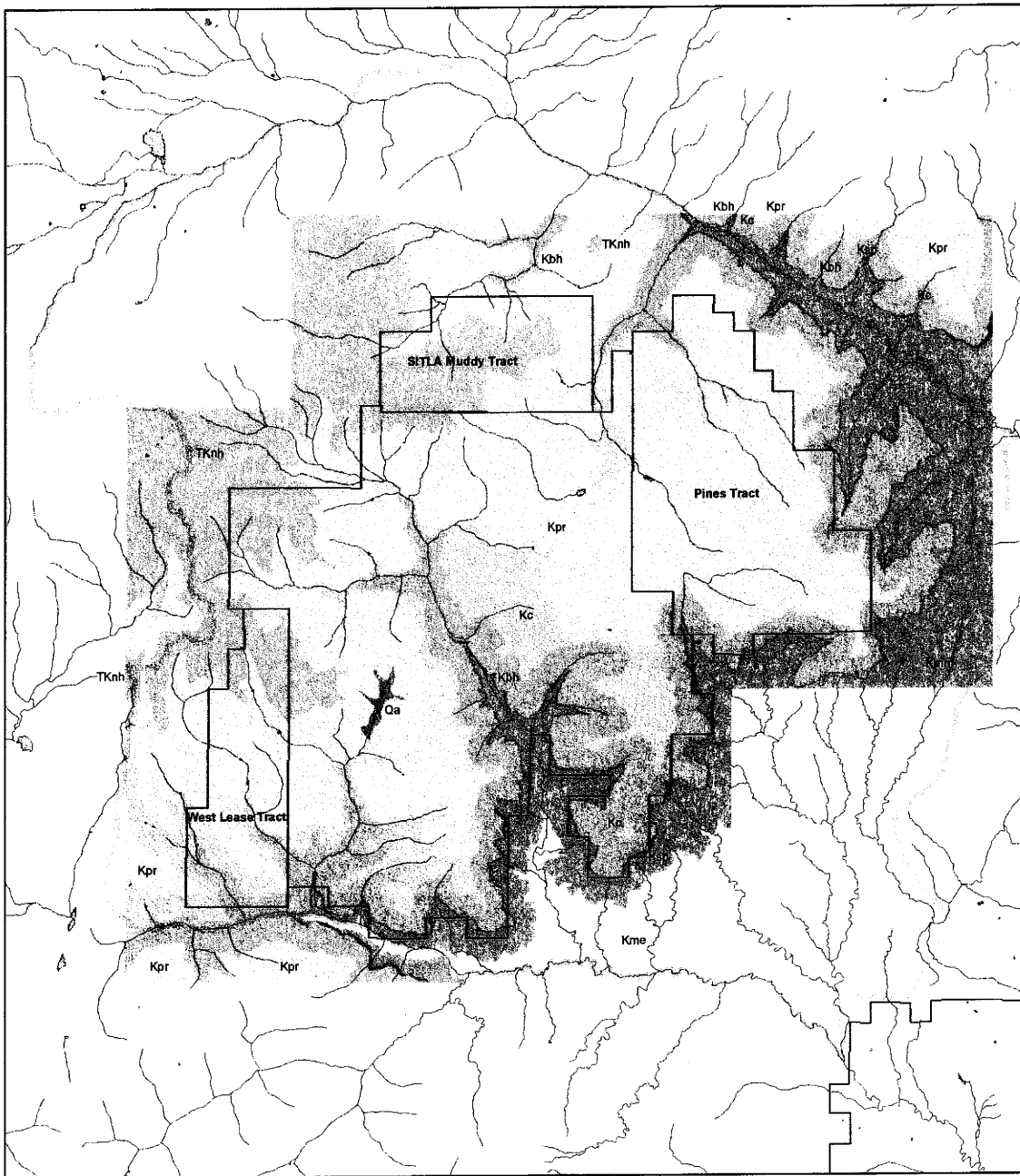
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CIA Areas



Cumulative Impact Area Quitchupah - Muddy Creek

Plate 3

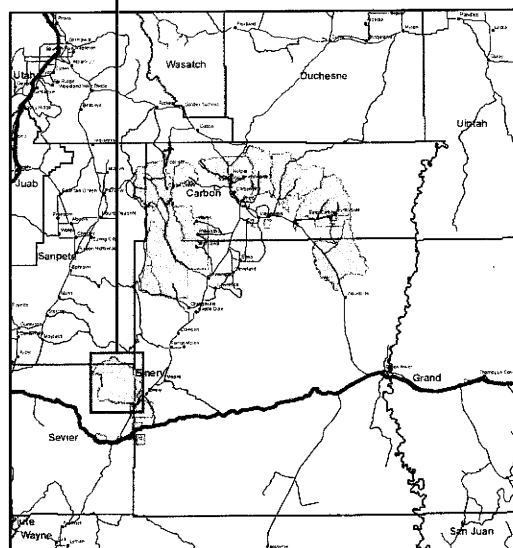
Geology Map
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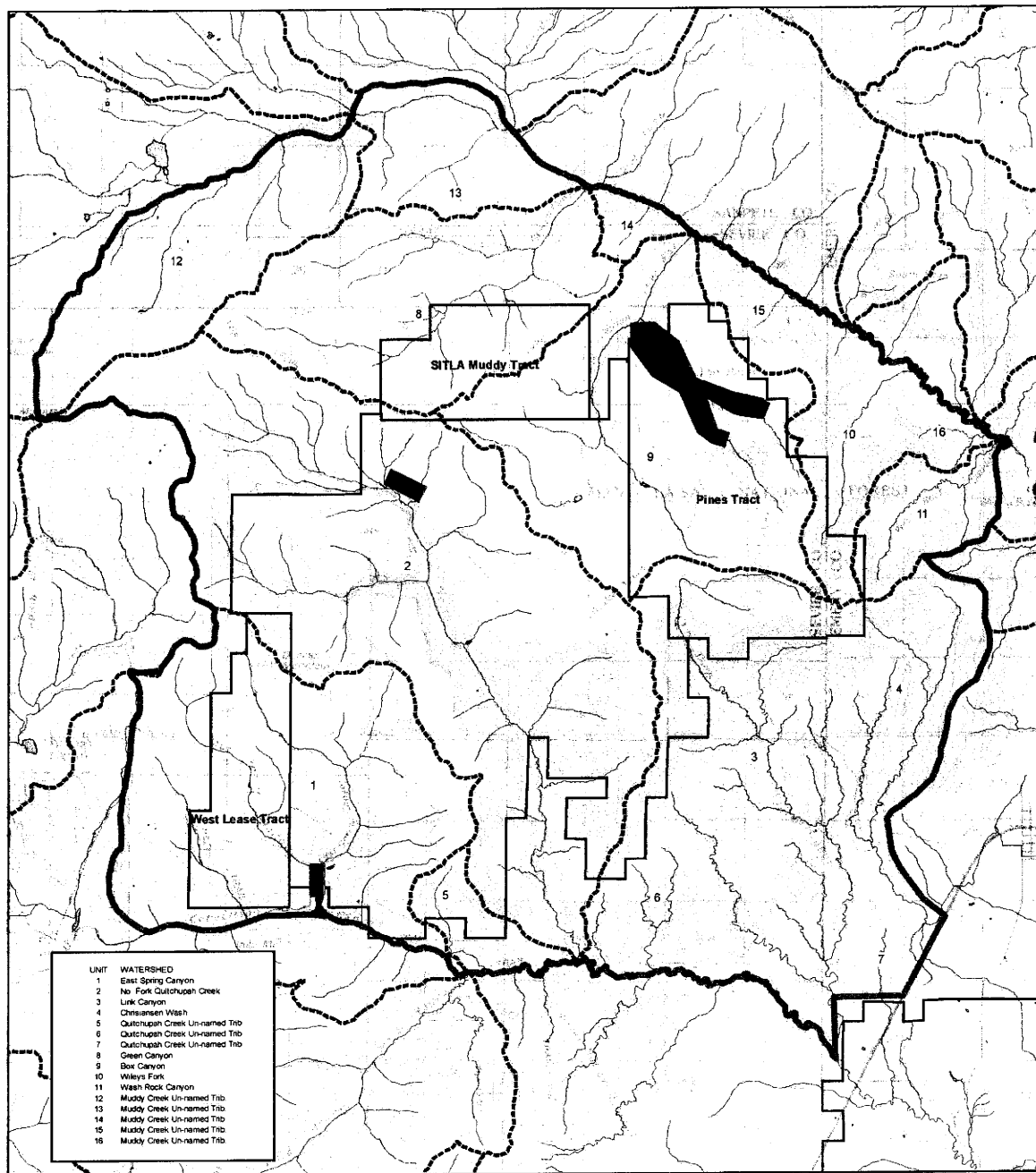
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CIA Areas



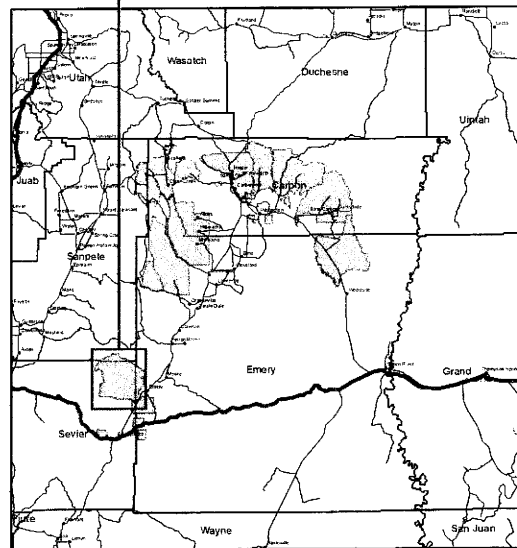
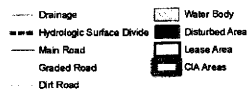
Cumulative Impact Area Quitchupah - Muddy Creek

Plate 4

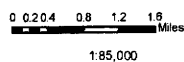
Hydrology Map

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CIA Areas



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United States Department of the Interior

OFFICE OF SURFACE MINING
Reclamation and Enforcement
Western Region Office
1999 Broadway, Suite 3320
Denver, CO 80202-3050
October 12, 2010



UT-0026

Utah Division of Oil, Gas, & Mining
Coal Regulatory Program
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

RE: Canyon Fuel Company, LLC "SUFCO" Mine - Application for a Permit Revision, West Lease Modification Amendment, Task ID No. 3609

Dear Sir or Madam:

This is in response to the Utah Division of Oil, Gas & Mining's (UT-DOGM) September 9, 2010, request for a decision, under 30 CFR 944.30, whether the above subject permit revision constitutes a mining plan modification.

Mining plan approvals by the Secretary of the Interior are required under the Mineral Leasing Act of 1920, 30 U.S.C. 181, *et seq.* before coal mining can occur on Federal lands. This letter serves to document OSM's determination whether or not a mining plan approval from the Secretary is required for the above permitting action.

OSM's review of the Application for a Permit Revision, West Lease Modification Amendment, has determined that it proposes add three Federal lease amendments to the SUFCO mine, Utah State permit C/041/0002. The amendment of Federal lease SL-062583 adds 877.06 acres in parts of Sections 2, 3, 10, 11, T.22S., R.4E., amendment of Federal lease U-47080 adds 795.68 acres in part of Section 35, T.21S., R.5E., and parts of Sections 2 and 3, T.22S., R.4E., and amendment of Federal lease U-63214 adds 640.0 acres in parts of Sections 26 and 35, T.21S., R.4E..

Based on a review of the activities associated with the permit revision, OSM has determined that the proposal meets the requirements of 30 CFR 746.18(d)(3)(i). Therefore, the proposed permit revision does not constitute a mining plan action requiring Secretarial approval.

OSM's decision was based solely upon the Federal regulations under 30 CFR PART 746 and not the technical aspects of the revision application itself. Consequently, OSM's decision does not relieve UT-DOGM from coordinating the review and approval of the Application for a Permit Revision, West Lease Modification Amendment, with other Federal agencies for compliance with other Federal regulations.

RECEIVED

OCT 14 2010

DIV. OF OIL, GAS & MINING

OSM also electronically transmitted the September 9, 2010, request to the Bureau of Land Management and the USDA Forest Service for their review and comment.

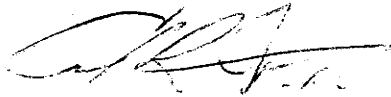
In electronic submittals dated October 7, 2010, the USDA Forest Service Fishlake National Forest stated in its opinion the proposed permit revision does not constitute a mining plan action requiring Secretarial approval.

The Bureau of Land Management did not provide any comments in the thirty day time frame established by the Federal regulations under 30 CFR 944.30, Article VI. D.

Please notify the applicant of our decision on this matter.

Should you have any questions regarding this letter or approval, please contact Carl R. Johnston, Utah Federal Lands coordinator, at (303) 293-5038.

Sincerely,

A handwritten signature in black ink, appearing to read 'Robert Postle', is centered below the 'Sincerely,' text.

Robert Postle
Manager, Field Operations Branch

cc: BLM - Utah State Office
BLM - Price Field Office
USFS - Manti-La Sal NF
USFS - Fishlake NF
Denver Field Division



JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
Division of Oil, Gas & Mining

MICHAEL R. STYLER
Executive Director

JOHN R. BAZA
Division Director

Outgoing
C0410002
#3609
OK

October 4, 2010

Dave Ariotti, District Engineer
Department of Environmental Quality
P.O. Box 800
Price, Utah 84501

See attached
mailing list.

Subject: Agency Notification of Determination of Administrative Completeness for West Coal Lease Modifications, Canyon Fuel Company LLC, SUFCO Mine, C/041/0002, Task ID #3609, Outgoing File

Dear Mr. Ariotti:

The Division has determined that an application to add the west coal leases to the existing lease boundary area of the SUFCO mine is administratively complete. The application is to be processed as a significant revision due to a portion of the lease area being just outside the existing cumulative hydrologic impact assessment (CHIA) area as per R645-303-224.200. The additional Federal leases are identified as: SL-062583; U-47080; U-63214.

In compliance with the Utah Coal Mining Rules R645-300-121.300, R645-300-121.310, R645-300-121.320, and the Utah Coal Mining Act (UCA Section 40-10-1 et. seq.), notice is hereby given to all appropriate agencies having a jurisdiction or an interest in the area of the operations that this application is available for public review.

This lease boundary area is located in Sevier County. A location map is attached for your information. This application is available for public review at:

Coal Regulatory Program
Division of Oil, Gas & Mining
West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

Sevier County Courthouse
250 N Main St #124
Richfield, UT 84701

Please comment by November 30, 2010. Comments may be addressed to:

Coal Regulatory Program
Division of Oil, Gas & Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

If you have any questions, please call me at (801) 538-5320, or Daron Haddock at (801) 538-5325.

Sincerely,

A handwritten signature in black ink, appearing to read 'Dana Dean', with a stylized, cursive script.

Dana Dean
Associate Director, Mining

DRH/AAA/sqs
Attachment
cc: Price Field Office
O:\041002.SUF\WG3609\3609AGENCYNOTIFICATION.DOC

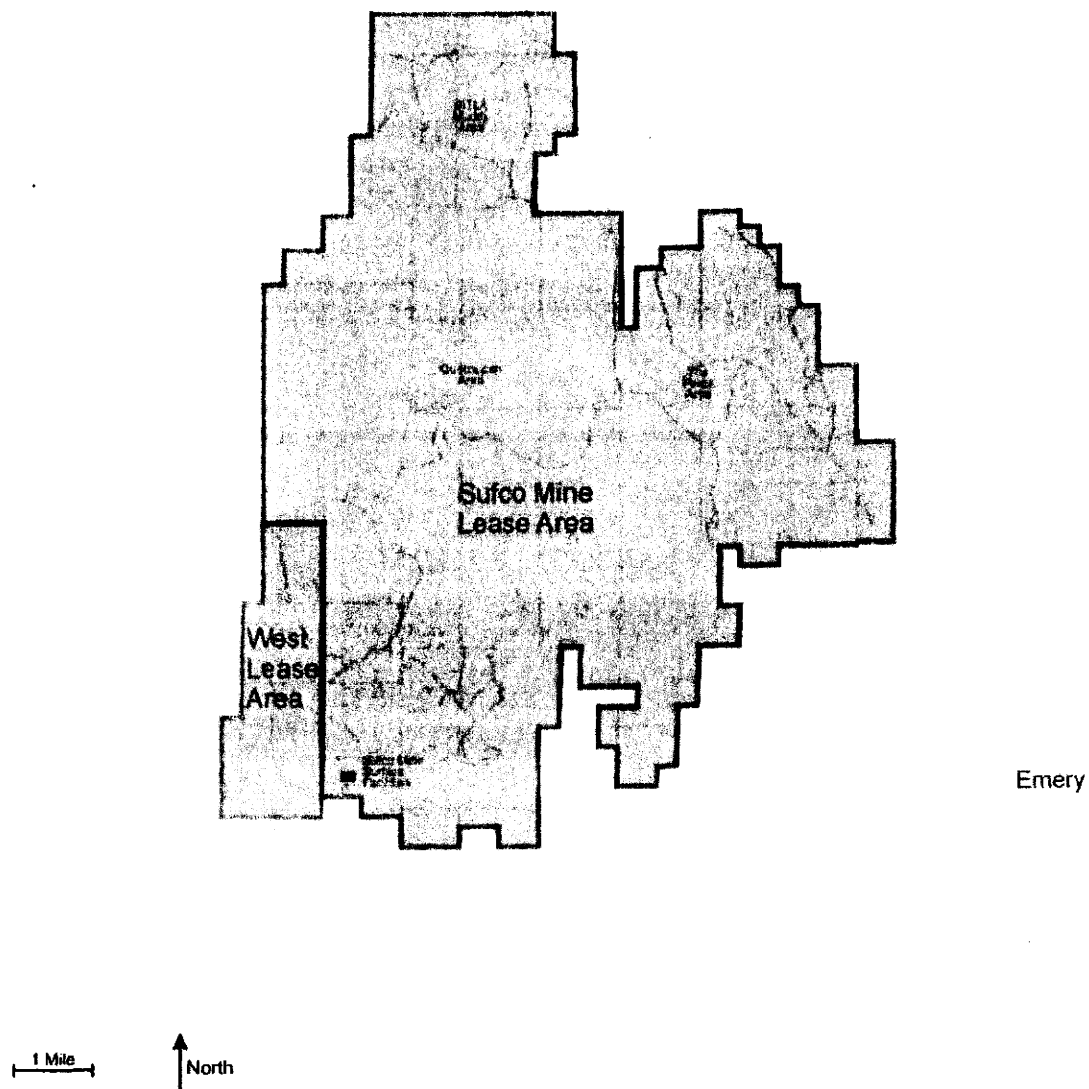


Figure 1 Location of Sufco Mine and West Lease areas.

Dave Ariotti, District Engineer
Dept of Environmental Quality
P.O. Box 800
Price, Utah 84501
Kevin Carter, Director
Trust Lands Administration
675 East 500 South, Suite 500
Salt Lake City, Utah 84102
Jim Fauver
Castle Valley Ranch
4020 East Moore Cutoff Road
Emery, Utah 84522
John Harja, Manager
DNR-Natural Resource Policy Grp
5110 State Office Building
Salt Lake City, Utah 84114-2477
Vaughan Hughes
Bureau of Land Management
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Price, Utah 84501
Darrell V. Leamaster, Dist Manager
Castle Valley Special Service Dist
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Castle Dale, Utah 84513
Lee McElprang, Chairman
Emery Water Conservancy District
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Castle Dale, Utah 84513
Erik Petersen
Petersen Hydrologic
2695 North 600 East
Lehi, Utah 84043
Gary L. Roeder, District Engineer
Natural Resource Conservation
540 West Price River Drive
Price, Utah 84501
Marc Stilson, Regional Engineer
Division of Water Rights
P.O.Box 718
Price, Utah 84501

Kelly Beck, RDCC Administrator
DNR-Natural Resource Policy Grp
5110 State Office Building
Salt Lake City, Utah 84114-2477
Larry Crist, Field Supervisor
U.S. Fish & Wildlife Service
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West Valley City, Utah 84119
James Fulton, Chief, DFD
Office of Surface Mining
1999 Broadway, Suite 3320
Denver, Colorado 80202-3050
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Division of Water Rights
P.O. Box 718
Price, Utah 84501
Jay Mark Humphrey
Emery Water Conservancy District
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Castle Dale, Utah 84513
Tom Lloyd, District Geologist
Forest Service
115 West Canyon Road, Box 310
Ferron, Utah 84523
Jeff McKenzie
Bureau of Land Management
P.O. Box 45155
Salt Lake City, Utah 84145-0155
Ray Peterson
Emery County Public Lands
P.O. Box 1298
Castle Dale, Utah 84513
Allen Rowley, Supervisor
U.S. Forest Service
115 East 900 North
Richfield, Utah 84701
Dennis Ward, President
HCIC
P.O. Box 327
Huntington, Utah 84528

Bob Butero, Director
United Mine Workers of America
6525 West 44th Avenue
Wheat Ridge, Colorado 80033
Palmer Depaulis, Executive Director
Community and Culture Department
324 South State Street, Suite 500
Salt Lake City, Utah 84111
Chris Hansen
Canyon Fuel Company, LLC
HC 35 Box 380
Helper, Utah 84526
Bill Howell, Executive Director
Southeastern Utah AOG
P.O. Box 1106
Price, Utah 84501
Jim Karpowitz, Director
Division of Wildlife Resources
1594 West North Temple
Salt Lake City, Utah 84114
Stan Mathis
Cottonwood Creek Conservation Irr
P.O. Box 687
Orangeville, Utah 84537
Phil Notarianni, Director
Utah Division of State History
300 Rio Grande
Salt Lake City, Utah 84101
Robbie Roberts, Regional Admin
Environmental Protection Agency
1595 Wynkoop Street
Denver, Colorado 80202-1129
William Sinclair, Deputy Director
Dept of Environmental Quality
P.O. Box 458810
Salt Lake City, Utah 84114-4810
Bruce Wilson
Emery County Public Lands Council
75 East Main
Castle Dale, Utah 84513

Chris Wood, Habitat Manager
Division of Wildlife Resources
319 North Carbonville Rd. #A
Price, Utah 84501

Ann O'Brien

Price River Water Users

375 So Carbon Avenue, Suite A10

Price, Utah 84501

Pamela Brown, Forest Supervisor
U.S. Forest Service
599 West Price River Drive
Price, Utah 84501

Sue Wiler

Bureau of Land Management

125 South 600 West

Price, Utah 84501

Misty Christensen, Mayor
Emery City
P.O. Box 108
Emery, Utah 84522



GARY R. HERBERT
Governor

GREGORY S. BELL
Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

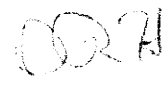
MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining

JOHN R. BAZA
Division Director

March 17, 2011

TO: Internal File

FROM: Daron R. Haddock, Permit Supervisor 

RE: Compliance Review for Section 510 (c) Findings – Sufco Mine, Canyon Fuel Company LLC, C/041/0002, Task ID #3725

As of the writing of this memo, there are no NOVS or COs which are not corrected or in the process of being corrected. There are no finalized Civil Penalties, which are outstanding and overdue in the name of Canyon Fuel Company LLC. Canyon Fuel Company LLC does not demonstrate a pattern of willful violations, nor have they been subject to any bond forfeitures for any operation in the state of Utah.

The recommendation from the Applicant Violator System (AVS) denotes that all connected entities either do not have any civil penalties or are under a settlement agreement (attached).

O:\041002.SUF\PERMIT\2011\510C.DOC



U.S. Department of the Interior Office of Surface Mining
Applicant/Violator System

suzanne.steab (UT) | Logo

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[HOME](#) > ENTITY EVALUATE

Evaluation on Permit Number: ACT041002 SEQ:4
0 Violations

[Print Report](#)

Permit Evaluation

Permit Number	ACT041002 SEQ:4
Permitee Name	142816 Canyon Fuel Company LLC
Date of Request	3/17/2011 9:46:22 AM
Requestor	suzanne.steab

CAUTION: The Applicant/Violator System (AVS) is an informational database. Permit eligibility determinations are made by the regulatory authority with jurisdiction over the permit application not by the AVS. Results which display outstanding violations may not include critical information about settlements or other conditions that affect permit eligibility. Consult the AVS Office at 800-643-9748 for verification of information prior to making decisions on these results.

There were no violations retrieved by the system

Evaluation OFT

Entities: 100

109255 Atlantic Richfield Co - ()
---061928 Mike R Bowlin - (Chairman of the Board)
---061928 Mike R Bowlin - (Chief Executive Officer)
---062210 Henry E Wendt - (Director)
---084987 Harrell L Bilhartz Jr - (Senior Vice President)
---086342 Marie L Knowles - (Chief Financial Officer)
---086342 Marie L Knowles - (Director)
---086342 Marie L Knowles - (Executive Vice President)
---113155 Lodwick M Cook - (Director)
---113157 John Gavin - (Director)
---113158 Hanna H Gray - (Director)
---113175 William E Wade Jr - (Director)
---113175 William E Wade Jr - (Executive Vice President)
---113175 William E Wade Jr - (President)
---113180 Mark L Hazelwood - (Senior Vice President)
---113185 Patricia N Boinski - (Assistant Secretary)

---113186 Patrick J Brophy - (Assistant Secretary)
---113187 James R Coffee - (Assistant Secretary)
---113190 Thomas F Linn - (Assistant Secretary)
---113191 Ronald W Macdonald - (Assistant Secretary)
---113192 Richard C Morse - (Assistant Secretary)
---113194 Paul J Richmond - (Assistant Secretary)
---113195 Thomas C Roantree Iii - (Assistant Secretary)
---113199 Diane A Ward - (Assistant Secretary)
---113200 Bruce G Whitmore - (Secretary)
---113200 Bruce G Whitmore - (Senior Vice President)
---113202 Patrick J Ellingsworth - (Corporate Officer)
---113202 Patrick J Ellingsworth - (Vice President)
---113205 Allen C Holmes - (Vice President)
---120542 Anthony G Fernandes - (Director)
---120542 Anthony G Fernandes - (Executive Vice President)
---120546 Terry G Dallas - (Senior Vice President)
---120546 Terry G Dallas - (Treasurer)
---122949 Frank D Boren - (Director)
---122951 John B Slaughter - (Director)
---122952 Beverly L Hamilton - (Vice President)
---129866 Michael E Wiley - (Director)
---129866 Michael E Wiley - (Executive Vice President)
---129870 Robert E Mcmanus - (Corporate Officer)
---130259 Daniel J Rolf - (Assistant Secretary)
---131979 Allan L Comstock - (Controller)
---131979 Allan L Comstock - (Vice President)
---131980 John H Kelly - (Senior Vice President)
---131981 J Kenneth Thompson - (Executive Vice President)
---131981 J Kenneth Thompson - (Senior Vice President)
---135502 Stephen R Mut - (Senior Vice President)
---135505 Patricia B Fisher - (Assistant Secretary)
---135779 Kent Kresa - (Director)
---137568 George S Davis - (Assistant Treasurer)
---137580 David T McLaughlin - (Director)
---137583 W Steven Jones - (Assistant Secretary)
---137584 John R Lucas Jr - (Assistant Secretary)
---137585 Stephen Molina - (Assistant Secretary)
---137586 Ronald C Redcay - (Assistant Secretary)
---142826 John B Cheatham - (Senior Vice President)
---142842 Robert M Pine - (Controller)
---142843 Ronald R Williams - (Corporate Officer)
---142844 E Larry Cantu - (Assistant Secretary)
---142845 Susan O Liebson - (Assistant Secretary)
---142846 David W Marquez - (Assistant Secretary)
---142847 Karen R Monroe - (Assistant Secretary)
---142848 Eric E Sigsbey - (Assistant Secretary)
---142849 Antoinette M Tadolini - (Assistant Secretary)
---144427 Barbara M Bartoletti - (Secretary)
---145261 Donald R Voelte - (Senior Vice President)

---145262 Robert L Healy - (Vice President)
---145263 Ian F Chate - (Assistant Secretary)
---145264 June I Rose - (Assistant Secretary)
---145595 Arch Western Resources Llc - (Subsidiary Company)
-----098471 David B Peugh - (Vice President)
-----127325 Robert G Jones - (Assistant Secretary)
-----127325 Robert G Jones - (Vice President)
-----129563 Charles David Steele - (Vice President)
-----138467 Paul A Lang - (President)
-----146381 James E Florczak - (Treasurer)
-----146381 James E Florczak - (Vice President)
-----155171 Jolene Jouett Mermis - (Assistant Secretary)
-----155430 Arch Western Bituminous Group Llc - (Subsidiary Company)
-----093320 Robert W Shanks - (Director)
-----129465 Eugene E Diclaudio - (Director)
-----129465 Eugene E Diclaudio - (Manager)
-----129465 Eugene E Diclaudio - (President)
-----129563 Charles David Steele - (Vice President)
-----133451 John W Eaves - (Director)
-----142816 Canyon Fuel Company LLC - (Subsidiary Company)
-----093320 Robert W Shanks - (Director)
-----113124 David N Warnecke - (Vice President)
-----129465 Eugene E Diclaudio - (Director)
-----129465 Eugene E Diclaudio - (President)
-----129563 Charles David Steele - (Vice President)
-----133451 John W Eaves - (Director)
-----146381 James E Florczak - (Treasurer)
-----146381 James E Florczak - (Vice President)
-----155171 Jolene Jouett Mermis - (Assistant Secretary)
-----250063 Jon S Ploetz - (Secretary)
-----146381 James E Florczak - (Treasurer)
-----146381 James E Florczak - (Vice President)
-----155171 Jolene Jouett Mermis - (Assistant Secretary)
-----250063 Jon S Ploetz - (Secretary)
-----158835 Patricia A Will - (Assistant Treasurer)
-----247567 John T Drexler - (Vice President)
-----250063 Jon S Ploetz - (Secretary)
---145597 Mark J Friedman - (Assistant Secretary)
---145601 Gary L Tooker - (Director)
---145602 Denise L Ramos - (Assistant Treasurer)
---145603 Donald A Davis - (Vice President)
---145604 Roger E Truitt - (Senior Vice President)
---145605 Dodd W De Camp - (Vice President)
---145616 John M Slater - (Senior Vice President)
144492 Arch Coal Inc - ()
---044179 Clarence Henry Besten Jr - (Senior Vice President)
---098471 David B Peugh - (Vice President)
---113124 David N Warnecke - (Vice President)
---118428 Thomas A Lockhart - (Director)

---119588 James Robert Boyd - (Director)
---125225 Steven F Leer - (Chairman of the Board)
---125225 Steven F Leer - (Chief Executive Officer)
---125225 Steven F Leer - (Director)
---127325 Robert G Jones - (General Counsel)
---127325 Robert G Jones - (Secretary)
---127325 Robert G Jones - (Senior Vice President)
---129563 Charles David Steele - (Vice President)
---133451 John W Eaves - (Chief Operations Officer)
---133451 John W Eaves - (Director)
---133451 John W Eaves - (President)
---138362 Douglas H Hunt - (Director)
---138467 Paul A Lang - (Senior Vice President)
---139984 Peter I Wold - (Director)
---142816 Canyon Fuel Company LLC - (Subsidiary Company)
-----093320 Robert W Shanks - (Director)
-----113124 David N Warnecke - (Vice President)
-----129465 Eugene E Diclaudio - (Director)
-----129465 Eugene E Diclaudio - (President)
-----129563 Charles David Steele - (Vice President)
-----133451 John W Eaves - (Director)
-----146381 James E Florczak - (Treasurer)
-----146381 James E Florczak - (Vice President)
-----155171 Jolene Jouett Mermis - (Assistant Secretary)
-----250063 Jon S Ploetz - (Secretary)
---145629 Arch Western Acquisition Corp - (Subsidiary Company)
-----044179 Clarence Henry Besten Jr - (Director)
-----098471 David B Peugh - (Director)
-----098471 David B Peugh - (Vice President)
-----129563 Charles David Steele - (Vice President)
-----138467 Paul A Lang - (Director)
-----138467 Paul A Lang - (President)
-----145595 Arch Western Resources Llc - (Subsidiary Company)
-----098471 David B Peugh - (Vice President)
-----127325 Robert G Jones - (Assistant Secretary)
-----127325 Robert G Jones - (Vice President)
-----129563 Charles David Steele - (Vice President)
-----138467 Paul A Lang - (President)
-----146381 James E Florczak - (Treasurer)
-----146381 James E Florczak - (Vice President)
-----155171 Jolene Jouett Mermis - (Assistant Secretary)
-----155430 Arch Western Bituminous Group Llc - (Subsidiary Company)
-----093320 Robert W Shanks - (Director)
-----129465 Eugene E Diclaudio - (Director)
-----129465 Eugene E Diclaudio - (Manager)
-----129465 Eugene E Diclaudio - (President)
-----129563 Charles David Steele - (Vice President)
-----133451 John W Eaves - (Director)
-----142816 Canyon Fuel Company LLC - (Subsidiary Company)

-----093320 Robert W Shanks - (Director)
-----113124 David N Warnecke - (Vice President)
-----129465 Eugene E Diclaudio - (Director)
-----129465 Eugene E Diclaudio - (President)
-----129563 Charles David Steele - (Vice President)
-----133451 John W Eaves - (Director)
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-----247567 John T Drexler - (Vice President)
-----250063 Jon S Ploetz - (Secretary)
-----146381 James E Florczak - (Treasurer)
-----146381 James E Florczak - (Vice President)
-----155171 Jolene Jouett Mermis - (Assistant Secretary)
-----247567 John T Drexler - (Vice President)
-----250063 Jon S Ploetz - (Secretary)
---146381 James E Florczak - (Treasurer)
---146805 Michael A Perry - (Director)
---147242 Theodore D Sands - (Director)
---147387 John W Lorson - (Corporate Officer)
---147387 John W Lorson - (Vice President)
---147951 Robert G Potter - (Director)
---149037 Wesley M Taylor - (Director)
---150775 Deck S Slone - (Vice President)
---152524 Anthony S Bumbico - (Vice President)
---153333 Sheila B Feldman - (Vice President)
---155172 Patricia Fry Godley - (Director)
---158670 Brian J Jennings - (Director)
---247567 John T Drexler - (Chief Financial Officer)
---247567 John T Drexler - (Senior Vice President)
---249046 Casey Warner - (Corporate Officer)
---249451 David E Hartley - (Corporate Officer)
---249451 David E Hartley - (Vice President)
---250063 Jon S Ploetz - (Assistant Secretary)
---250063 Jon S Ploetz - (General Counsel)
---250498 J Thomas Jones - (Director)

NarrativeRequest Narrative